Notebook, Volume 14

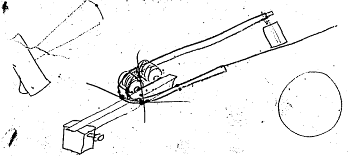
This volume covers the period January-November 1878, with a few dated items for 1879. The notes and drawings are by Edison, Charles Batchelor, James Adams, and John Kruesi. Most of the material relates to the telephone. There are also a few drawings of the aerophone, the aurophone, the phonograph, and the microphone. The volume consists of 173 numbered, unbound leaves.

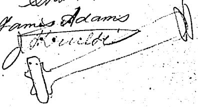
Missing pages, found in facsimile in the Telephone Interferences: 169.

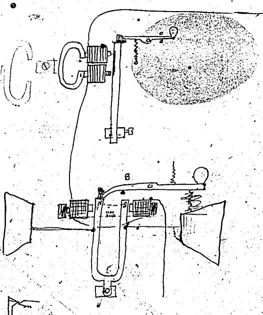
Missing pages: 8-9.
Page 8 was found, microfilmed in a supplement, and included here.

Model for Patent office

Jany 3 1878
T A Edison
Chas Batchelor
James Adams
J Kruesi







No 1

make.

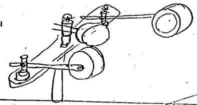
~~1 Reed~~
2 Keys
4 Spools
1 magnet
1 " bracket
1 Reed bracket
2 Spool brackets
1 Fork
1 Fork bracket
2. Speaking tubes

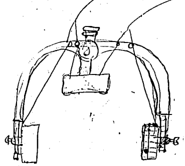
1

Speaking telegraph

Jan 3 1878

Chas Batchelor
James Adams
J Kruesi

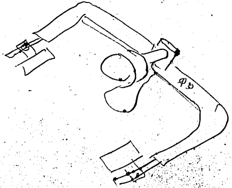




No 2

2 Small receiver with diaphragm + studs with holes + screws.
1 Tel speaker
1 " " change to go through post
1 Part of boxwood
2 Shims

Model

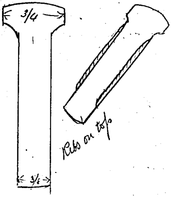


628

Diaphragms and armatures

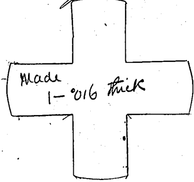
Jan 4th 1878

Chas Batchelor
James Adams



Made CB

Ribs on top



Made
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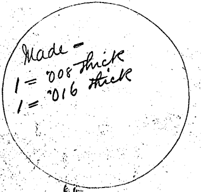
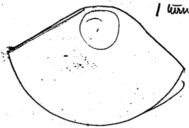


Made —
1 = ·008 thick
1 = ·016 thick

Made
1 Plain — ·006 thick
1 turned down edges ·016 thick

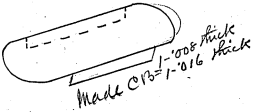


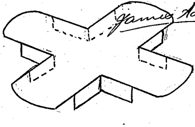
62½

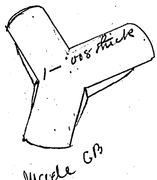
Jan 4th 1898

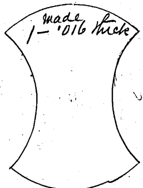
Diaphragms

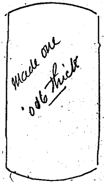
Chas Batchelor
James Adams

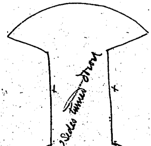

1-'008 thick
1-'016 thick
Made CB=

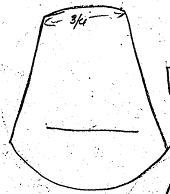


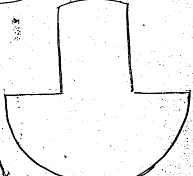

1-'008 thick
Made CB

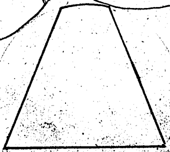

1- made '016 thick


made one '016 thick


2 Sides turned down

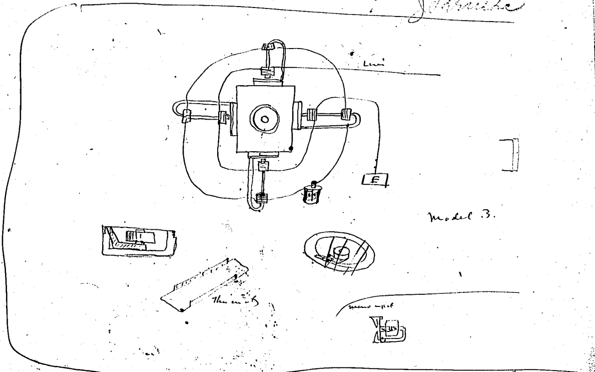




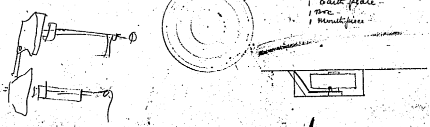


4

Jan 6th 1878
T A Edison
Chas Batchelor
James Adams
J Kruesi



4 Magnets steel –
4 Diaphragm holders –
8 Spools –
1 Cell Battery –
1 Earth plate –
1 Box –
1 Mouthpiece

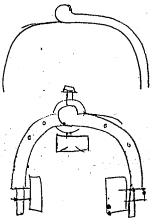


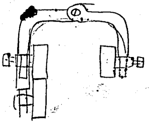
Jan 6 1876

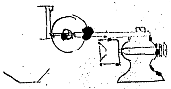
[illegible]

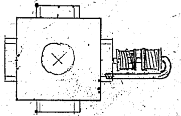
James Adams

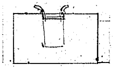
J Kruesi

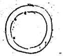








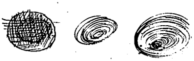




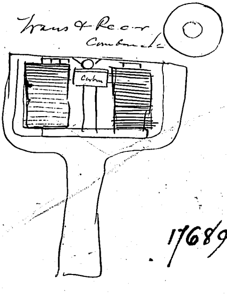
Spkg Telephone

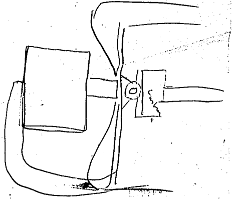
Jany 8 1878
T A Edison
Chas Batchelor

6, 10, — 14
10
10
10,



Trans & Recr Combined





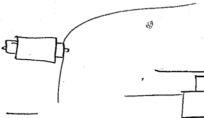
Boston

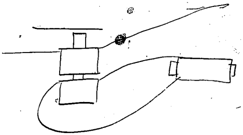
17689K

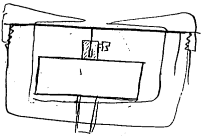
Portland Portland
Portland Portland
Portland
Portland

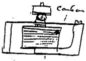
Spkg Telephone

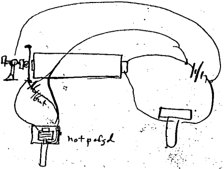
Jany 8th 1878
T A Edison
Chas Batchelor





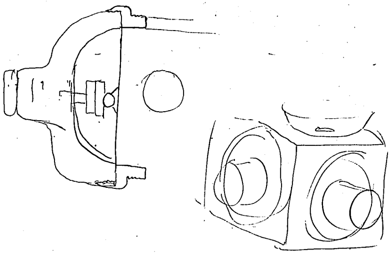


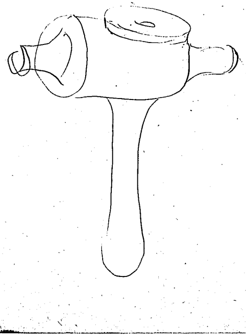



bat
not polzd

Spkg Telephone

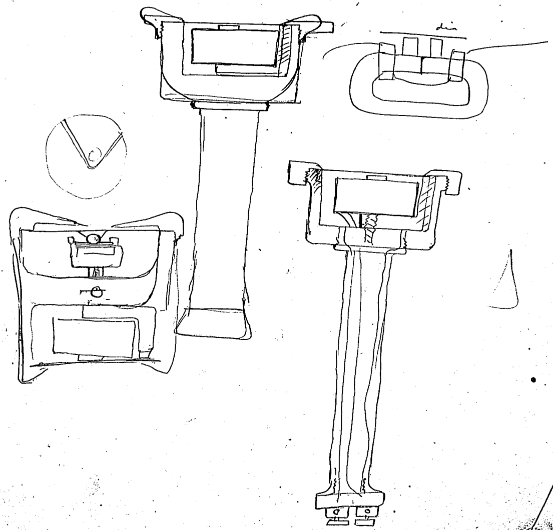
Jany 8 1878
7a Carbon
Chas Batchelor





Spkg Telephone.

Jany 8th 1878
T A Edison
Chas Batchelor



Spkg Telephone

Jany 8 1878.
T A Edison
Chas Batchelor

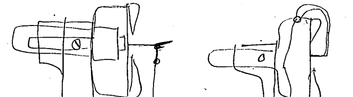
I apprehend much trouble when telephone wires become multiplied = and I think that Induction currents in many cases will have to be abandoned on account of their tension & consequent liability to jump to other wires; therefore my Carbon telephone using 2 or 3 cell of battery ~~cells~~ & placed directly in the line to vary its resistance will be the best. the receiving magnets which would set up high tension induction currents which would jump to other wires must be shunted to prevent this them of course would lower them but by using very short spools & cores slotted or of fine iron wire insulated ~~it~~ it would scarcely lower them appreciable = again the Emgraph which of itself sets up no return high tension current might be used in a short line I believe my telephone will be the only one for the future when the wires are greatly multiplied—

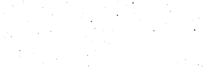
Spkg Telephone

Jany 8 1878

T.A. Edison

Chas Batchelor



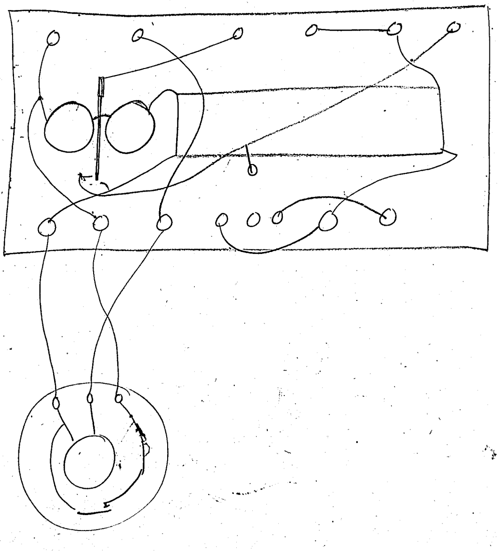

Magneto Bell.

Speaking telegraph.

Jan 12th 1878

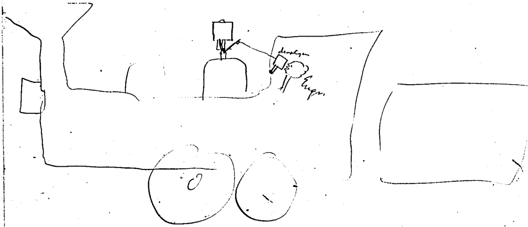
T A Edison

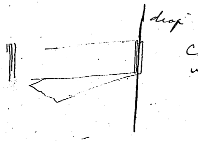
Chas Batchelor



January 17, 1878,
T. A. Edison

Steam Telephone;
or Airphone


diaphragm
Engr.

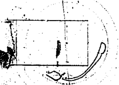


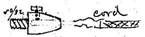
Compressed air & valve.
with

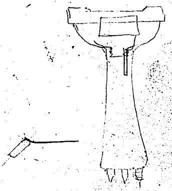
Speaking telephone Receiver

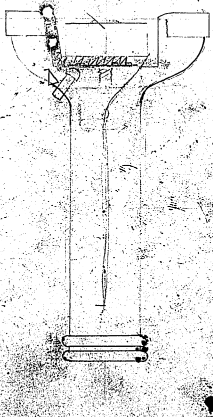
Jan 21st 1878

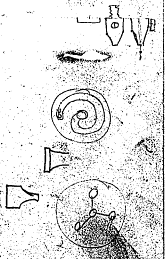
Chas Batchelor









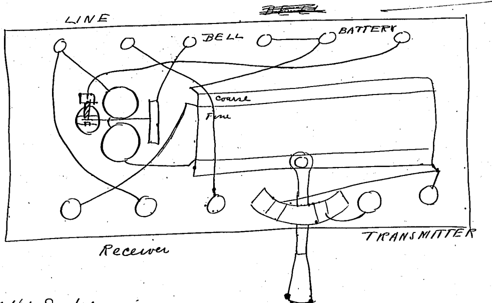


Jan 23 1878 — Jay

Speaking telephone.

The coils taken by T. Puskas Esq to Paris were connected up so:—

Chas Batchelor



Outfit Sent :—

One ① Phonograph.

He took another Phonograph from his house

Sailed on 'Cimbria' Hamburgh Line for Cherbourg, France

④ four Watson Batteries

(200) two hundred feet twisted kerite wire.

㊿ fifty feet of Kerite wire

② two transmitters (Batchelor's make)

② two receivers (1½ in diameter) no cut out.

{ one Batchelor make new pattern
{ one Bergman altered over

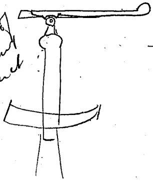
② two Bergman Bells

② two Bergman coils altered to above sketch

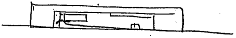
④ four Double conductor cords

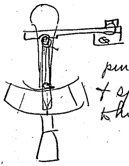
632 Speaking telephone   Jan 23rd 1878

Chas Batchelor

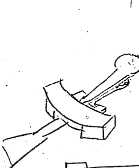


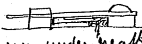
Wheel on end of lever + spring with notch under



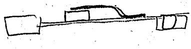


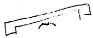
pin underneath lever + spring with notch in it to hold lu middle.

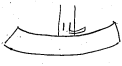




spring under neath lever with notch for lever to drop into—

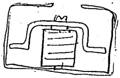


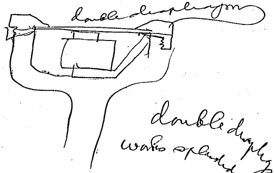




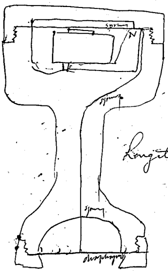
Telephone

Jany 23 1878
T A Edison
Chas Batchelor




double diaphragm

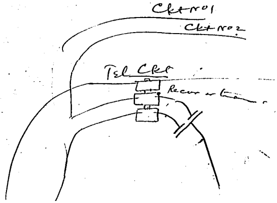
double diaphragm water splashed for


spring
N
spring
spring
diaphragm

Longitudinal vibration

Telephone

Jany 23 1878
TA Edison

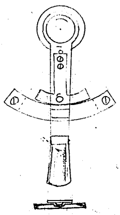

Ckt No 1
Ckt No 2
Tel Ckt
Recvr or tran

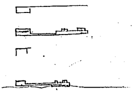
633

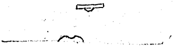
Jan 24 1878

Speaking telephone

Chas Batchelor





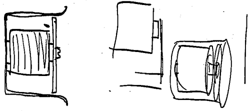


January 25 1878

Telephone — 636

I notice in organ pipes the chisel through which the wind passes is provided with teeth I propose to try this on the edges of the hole in the Telephone = Mr Roosevelt says it makes the tone purer gets rid of the hissing sounds = This may be good for phonograph also =

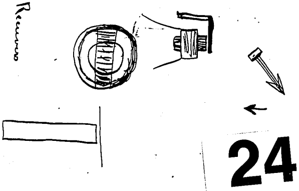
Jany 26th 1878
Adams



23

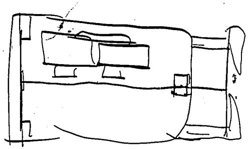
Jany 26th 1878
Adams

[illegible]



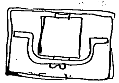
24

Jany 26 1878
Adams



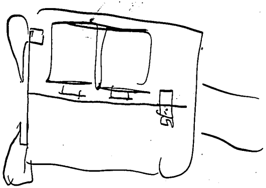
25

Jany 26th 1878
Adams



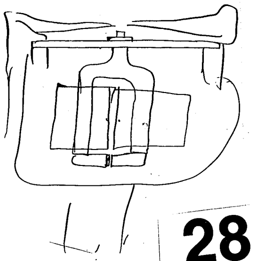
26

Jany 26th 1878
Adams



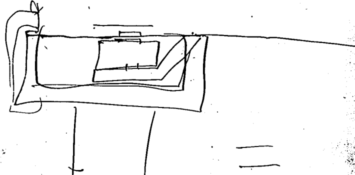
27

Jany 26th 1878
Adams



28

Jany 26th 1878
James Adams

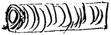


29

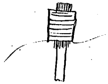
637

Speaking telegraph Jany 27th 1876

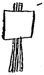
James Adams



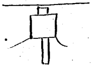
Thin tube with fine wire wound over it



Soft Iron wires stuck round the core
get it very good without any diaphragm



Four pieces of Steel wire magnetized



Copper diaphragm

can get talking as loud as
the Bell telephone

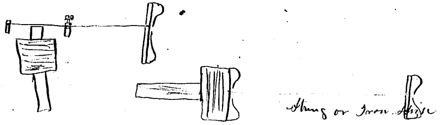
30

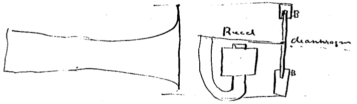
638

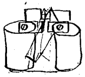
Speaking telephone

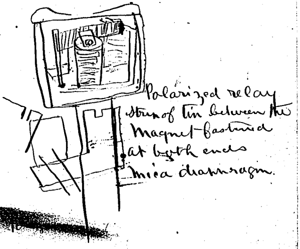
Jany 28th 1878

James Adams


String or Iron disc


Reed
diaphragm
B
B




Polarized relay
strip of tin between the
Magnet fastened
at both ends
mica diaphragm

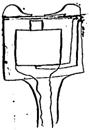
31

639

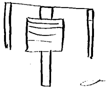
Speaking telephone

Jany 28th 1878

James Adams



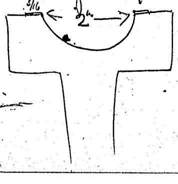
Mica diaphragm next the cone and Iron one over it gives the best talking yet



Conner cone & copper diaphragm

Alterations of Thau transmitters
Speaking Telephone Jan 31st 1898

1 Turn out mouthpiece & fit ring in.
2 Turn out body & fit ring in
3 Plug up and solder ~~holes~~ slots in rod
4. Body part of fluff cup must be left thicker as the thread is cut through
5 Make new screws for adjustment
6 Put new slot in rod same as model
7 Make this ~~set~~ the stops for both ends of adjmt
8 Make Bind posts with 10/32 screw & screw in rubber
9 Make screwdriver head iron screw for screwing up wire
10 Bind post & screw & adj. screw & stop screw nickelplated
11 Make new corks ~~like~~ and rubber like sample both must be like sample exactly specially in height.
12 ~~Flat rubber~~ Put in Boxwood cappiece instead of rubber
13 Diameter of inside of body cup 2" bearing of diaph. only 3/16. & mouthpiece to suit diaphragm must be



14 Bearing of diaph true.

Alterations on Bergmans receivers
Speaking Telephone .. Jan 31st 1878

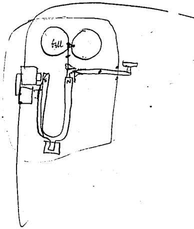
1 Make new earpiece like model
2 Make outside of diaph. 1 3/4 + inside of hole in cap 1½.
3 Bearing dead true "
4 ~~Make~~ Turn hole in body out + Cut thread in + fit piece in it, screwing it in & secure by rubber pin to prevent turning
5 Turn inside out to 1½ diameter and 11/16 deep. exact
6 Cut thread on for cap.
7 Make new magnets same as model
8 The part of face of magnet that stands inside of the circle x must be reduced not more than necessary to make diaph work free.

9 Make new covers like sample perfectly flat on top in the thickness of the diaphragm lower than the rim —
10 Bore hole same as model and put on bindposts & screw same as model and nickel plate same
11 Connections must be rubber covered wire

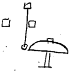
Good Idea

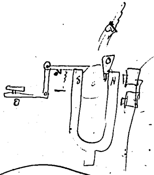
Magneto Electric Call Bell for private Houses Etc

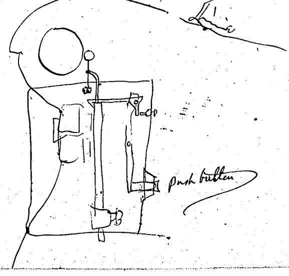
Feby 2 1878
TAEdison



ditto here =



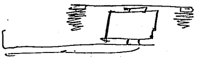


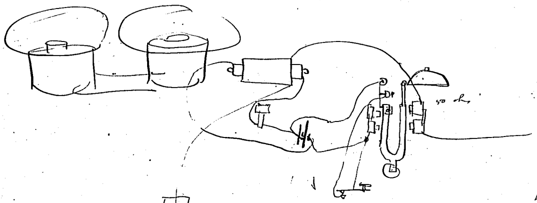

Line
push button

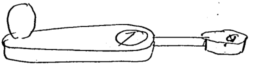
do here

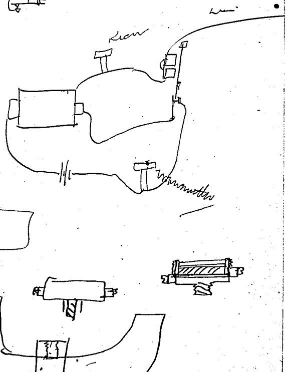
Telephone

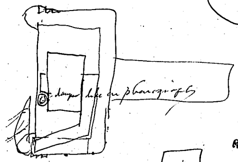
Feb 3, 1878
T A Edison

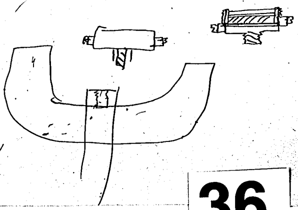


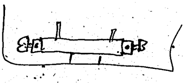





Line
Recvr
Transmitter


damper like on phonograph





640
Speaking telegraphe test
Menlo Park N J ~~to Philadelphia~~
Feb 4 1878

Bentley says
I am very much disturbed

I am very much astonished and so must any one be who reflects a minute. I recognized your voice instantly

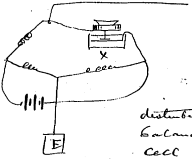
Bentley got all we said and repeated it back Morse

---

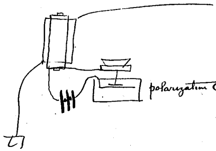
this opportunity to this afternoon and shall be glad to test them with you any time

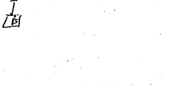
Telephone —

Feby. 7 1878
T A Edison



disturbing resistance of balance by a polarizing cell X =


polarization Cell =
E


Line -
Selenium
E

641

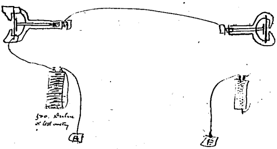
Telephone (Speaking) Feb. 10th 1878

Test of Coils for best

Chas Batchelor.

No 1 Coil not very good
No 5 Coil the best
No 7 coil weak
No 8 the best.
No 12 best of all - on Callaud & Carbon.
Resis ·6 primary 200 secondary

new telephone



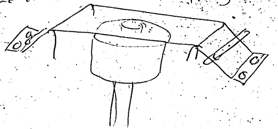
642

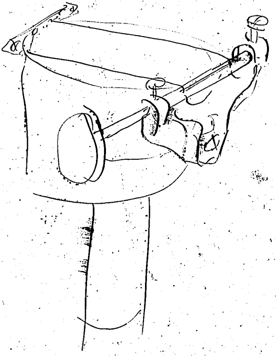
Phonograph & Teleph

Feby 12/78

Stretched diaphragms are the thing. Can use larger than ever & still get good articulation.

Besides the Loudness



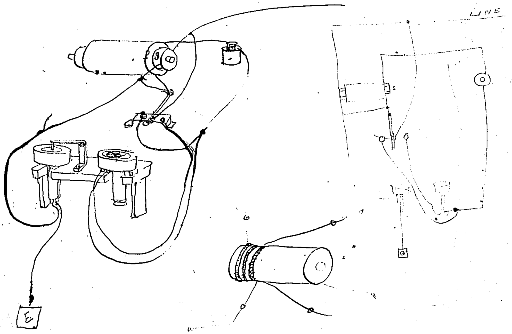


phone

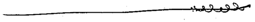
Feby 12/78

T A Edison

Chas Batchelor

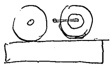


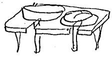
Model for patent office -

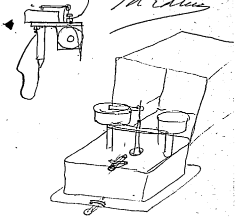


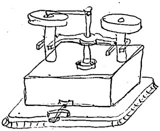
Telephone

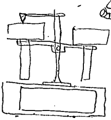
Feby 20 1878
TA Edison

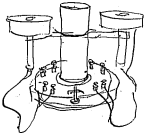


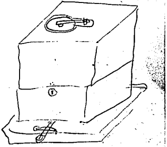












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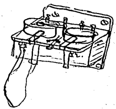
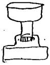
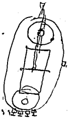






42

Feb. 20th 1878.
Speaking telephone   Chas Batchelor

Size of No 12 Coil the best we have found as yet.

size of secondary No 3~~4~~ 33 — 200·ohms   layers ~~even~~ ~~12~~ 10.
Size of Primary No- ~~16~~ 16 — ·6 ohms   odd. ~~4~~ 5.

Outside diameter same as before.
Diam. of hole 5/8.

Phonograph   TINFOIL
Size of ~~tinfoil~~ for small inst for shewing principle of Edisons Speaking Phonograph

✓ 7 3/4 long 2 in wide ·002 thick

n

Menlo Park NJ February 22 1878

Some directions for conducting empirical experiments in Telephony a voyage of discovery into the unknown,

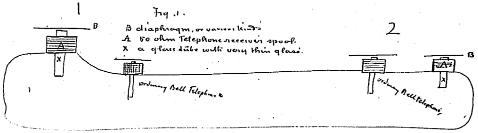
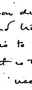


Fig. 1.
B diaphragm, or various kinds
A 50 ohm Telephone receiver spool.
X a glass tube with very thin glass.

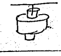
Fig 2
A 50 ohm Telephone spool.
B dia of various kinds
X glass tube,

Make cores to replace glass tubes of Copper Zinc Tin Brass lead. cast iron, Cadmium aluminium Black oxide Manganese; battery Carbon — Lamp black plumbago, Bismuth antimony. celluloid — Hard rubber, fused Chloride Zinc do Nitre — do. Sulphate Copper; do every salt that will fuse or mould — do every substance in Laboratory that will mould

Make a mould that will mould this size



In glass tube pour every kind of liquid in it in Laboratory and hold perpendicular; try and receive from a Bell telephone with Common diaphragm then change all kinds of diaphragms below described. if all a failure try and transmit to a Bell Telephone & make all the Changes; thus the 1st Experiment is to see if you can use it as a receiver from a Bell Telephone & the second experiment is to see if you can use it as a transmitter using the Bell telephone as a receiver = use diaphragms with points of various substances ~~do~~ dipping in liquid also not dipping

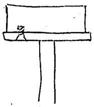


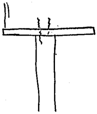
Feb 21st 1878

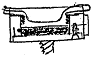
Chas Batchelor

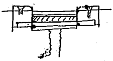
Speaking telephone

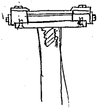
New Fluff Cup









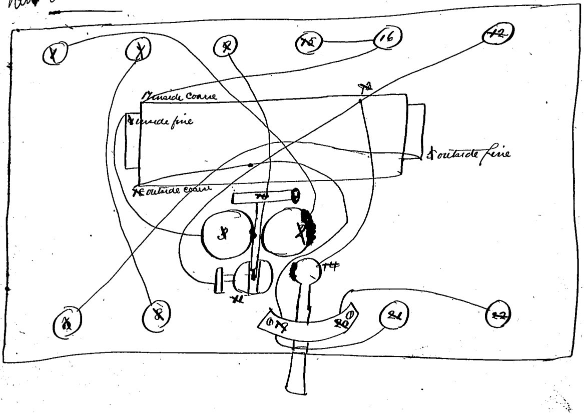


650

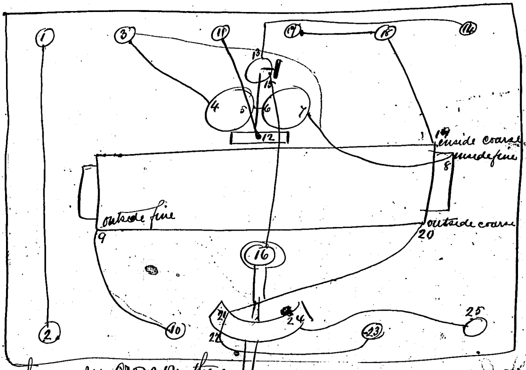
Speaking Telephone   February 27th 1878

Chas Batchelor

New Coil box connections.


1
3
9
15
16
12
13
7 inside coarse
4 inside fine
5 outside fine
6 outside coarse
10
3
4
14
11
19
20
2
8
21
22

Mr Kruesi Make all connections hereafter like this


1
3
11
17
18
14
13
15
4
5
6
7
12
19 inside coarse
inside fine
8
outside fine
9
outside coarse
20
16
21
24
22
2
10
23
25

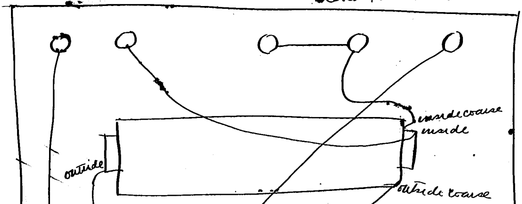
You see there is no cross on these in making these same connections on the other bases there may be.

Batchelor
Feb 24th 1878

648

Speaking telephone

Feb 27 1878
Chas Batchelor

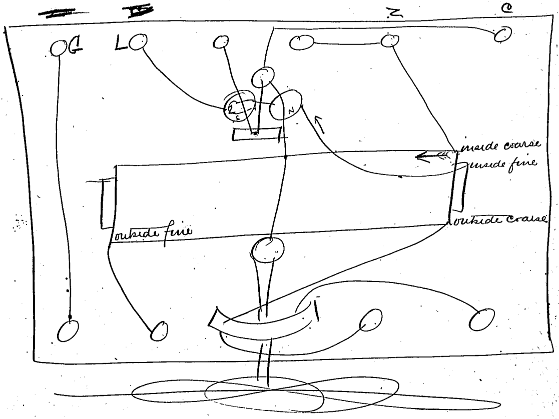

inside coarse
inside
outside
outside coarse

March 1878
J Kruesi

Feb. 27 1878

All connections hereafter will be made so

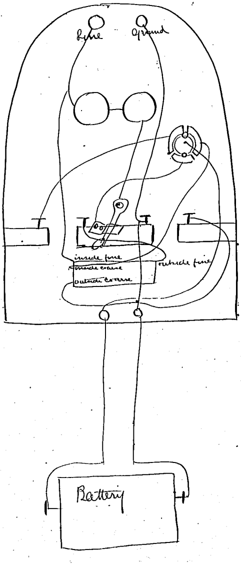
Chas Batchelor

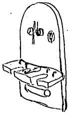

G
L
Z
C
S
N
inside coarse
inside fine
outside fine
outside coarse

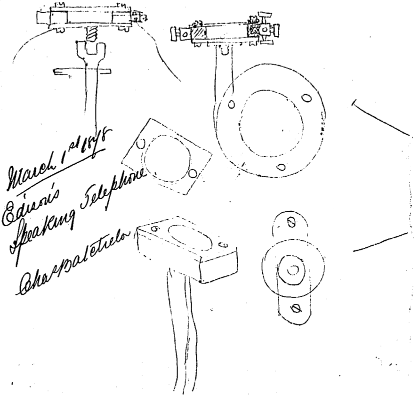
Speaking Telegraph — March 1st 1878.

Chas Batchelor

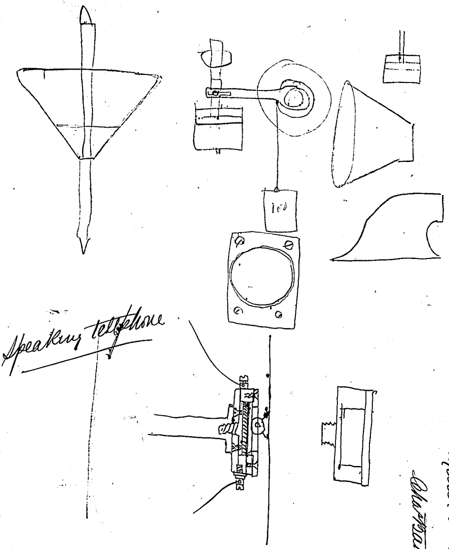
J Kruesi


Line
Ground
inside fine
inside coarse
outside fine
outside coarse
Battery





March 1st 1878
Edison's
Speaking Telephone
Chas Batchelor



Speaking telephone

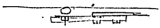
March 1st 1878
Chas Batchelor

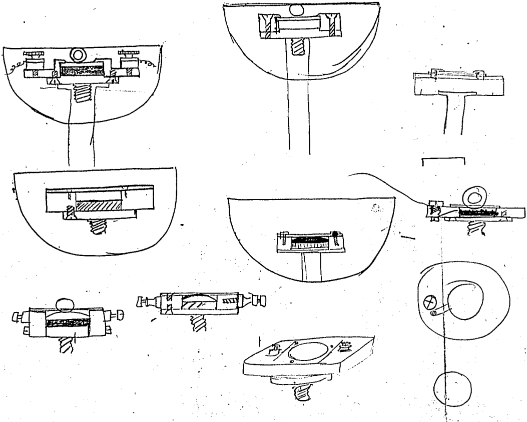
53

14

Speaking telegraph

Mch 6th 1878
Chas Batchelor





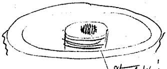
657

Speaking Telegraph

March 6th 1878

Chas Batchelor

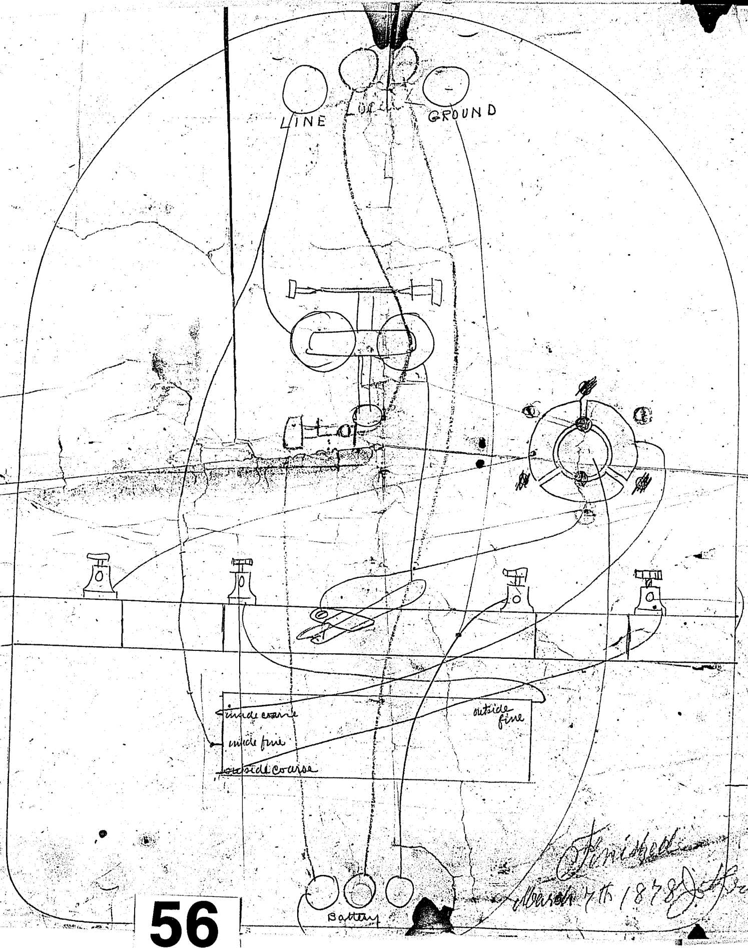
Wind spool of wire
with layer of steel
between each layer


Steel Wires all magnetised

Hard rubber core
& steel pins in magnetised

8

Chas Batchelor


LINE
GROUND
inside coarse
inside fine
outside coarse
outside fine
Battery

Finished
March 7th 1878 J Kruesi

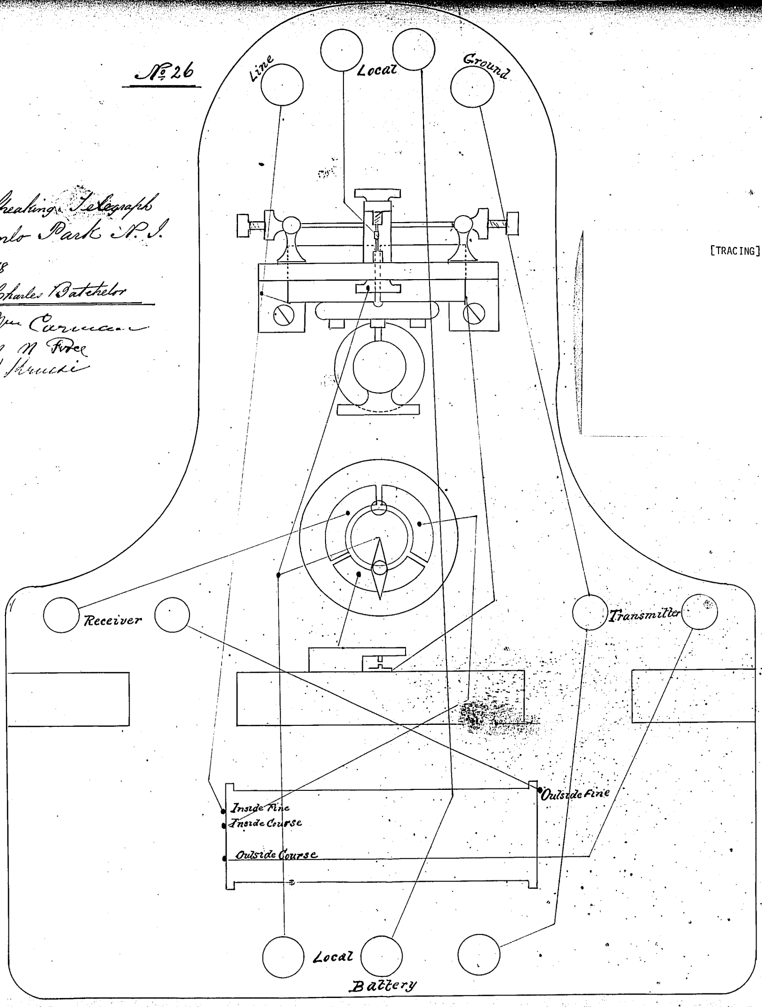
No 26

Edison's Speaking Telegraph
Menlo Park N. J.

March 18th 1878

Charles Batchelor

Wm Carman
M N Force
J Kruesi

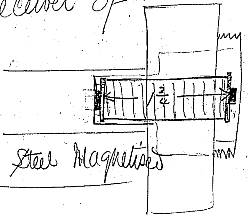

Line
Local
Ground
Receiver
Transmitter
Inside Fine
Inside Course
Outside Course
Outside Fine
Local
Battery

[TRACING]

Speaking telegraph

March 9th 1878
Chas Batchelor

Make Receiver of

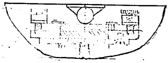


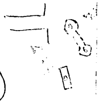
Core Steel Magnetised

658 1/2

Speaking Telegraph March 11th 1878

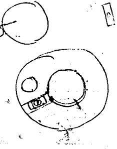
Chas Batchelor





Finished March 14th 1878

J Kruesi



#659

Speaking Telephone Jan. 14th 1878

Chas Batchelor

Test of Coils —

No 1 Coil

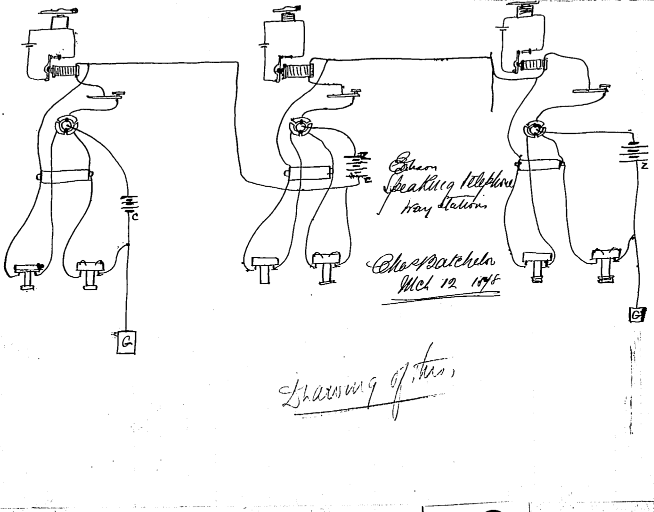
All

Primary #22 4 layers = res. 2·ohms
Secondary #30 9 " = res. 74 ohms

Kept at 160° Fah. for 1½ hours and soaked in boiling paraffin

Remarks

Shock on



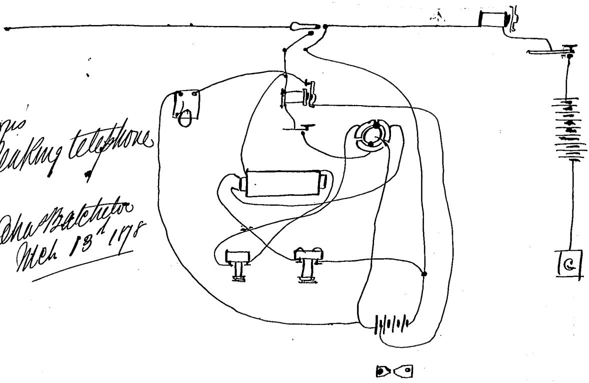
Edison
Speaking telephone
Way stations

Chas Batchelor
Mch 12 1878

Drawing of this

61

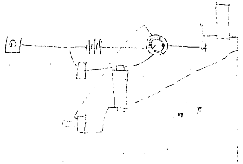
14

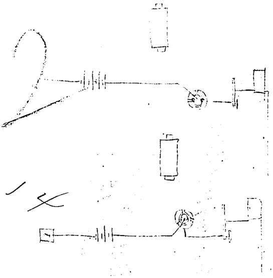


Edison's
Speaking telephone

Chas Batchelor
Mch 13 1878

Connections for Edison's
Speaking Telephone
Menlo Park N.J.
March. 17 1878





63

1. 2

March 14

Chas Batchelor

No 2 Coil

Primary #18 Silk 4 layers. = Res. ·44 ohms.
Secondary #28 Silk 9 " = Res. 40· ohms.

Dried at 160 Fah. 1½ hours & soaked in boiling parafn.

Short ck. ~~from~~ 1 Cell Carbon.

Remarks.

Speaking Telephone   March 14 1878

Chas Batchelor

Coil No 3

Prim. #18 _ 4 layers Res. ·54 ohms
Second. #28 - 9 " Res. 44 ohms.
Shock after Parafin & heating 1½ hours at 160° Fahr

Remarks.

Speaking Telephone March 14 1878

Chas Batchelor

Coil No 4

Prim. #14 Cotn. 4 layers — res. .14 ohms
Secondary #36 silk 9 " " 654 ohms
Heated 1½ hours 160° Fah. & soaked in Parafin

Remarks

Wire 1 17 – 5 – 35
36 – 9 –

#14
30

5 4
17

Wire 14 – 5 layers
30 – 17 layers

Speaking Telephone   March 14 1878

~~Chas Batchelor~~

Coil No 5.

Prim. #17 ~~layers~~ Silk 4 layers — Res. .34 ohms
Secondary #32 Silk 9 layers 150 ohms

Remarks.

Made two of these
immediately

664

Speaking Telephone March 14 1878

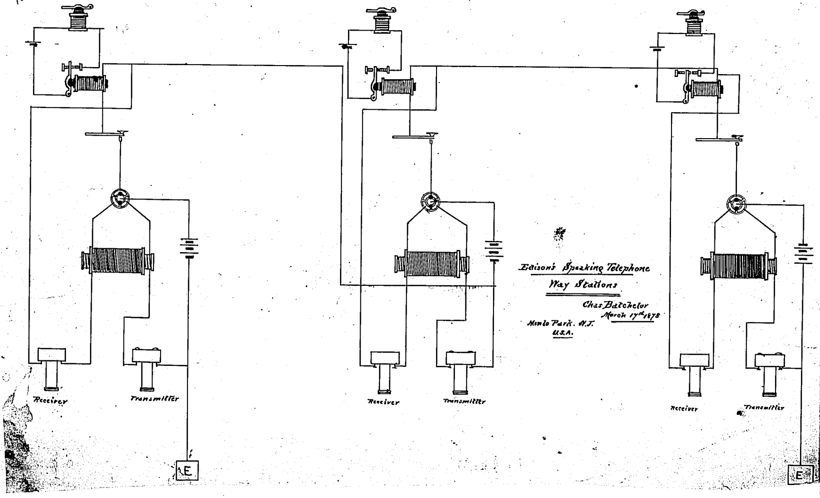
Chas Batchelor

No 6 Coil

Prim. #17 Silk 4 layers res.. ·69 ohms
Second. #34 Silk 9 " " 200 ohms.

Remarks

No. 23

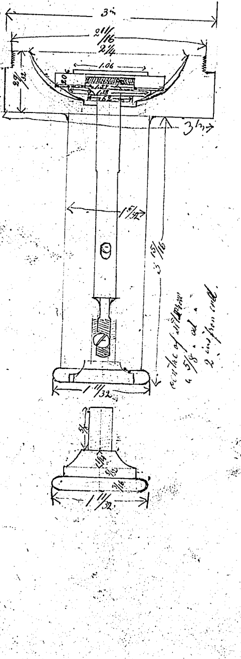


Edison's Speaking Telephone
Way Stations

Chas Batchelor
March 17th 1878
Menlo Park. N.J.
U.S.A.

Receiver
Transmitter
E
Receiver
Transmitter
Receiver
Transmitter
E

Speaking Telegraph. March 19th 1878 J. Kruesi

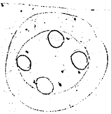

3 in
2 11/16
2 1/4
1.06
2 9/32
.06
1.57
1.18
.62
3 1/2
1 5/32
3 15/16
centre of ... 4 5/8 ... 2 in from end.
1 11/32
5/8
1 11/32

7
9
7
8
3
34 = 11/32
20 9

9
7
.08
3
.27

.605
.270
.335

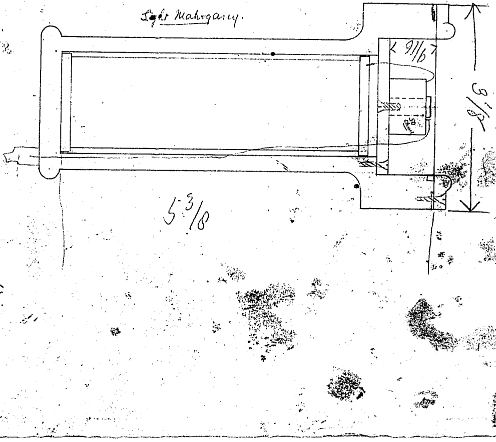
70



No 34 Design for new receiver on Induct plan March 23rd 1878

Chas Batchelor

Light Mahogany.



9/16
3/8
50 ohms
5 3/8

Connection made to Core through

996

Speaking telephone

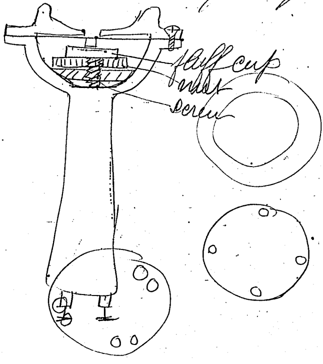
March 28 1878

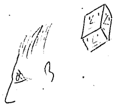
Chas Batchelor

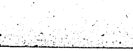
J Kruesi

Transmitter with adjustment in cup

Do not give up


plaff cup
nut
screw



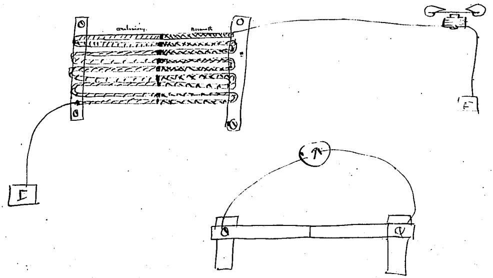


665

Telephone,

March 23 1878.

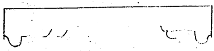
T A Edison

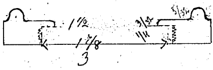


Thermo Electric telephone;

Sound waves bends junctures giving heat or rather Electric waves corresponding in strength to the air or sound waves.

Speaking Telegraph March 25th 1878
Recvrs.
J Kruesi




1/2
3/32
5/32
1/4
1 7/8
3

Mch 26th 1878

Speaking telephone

what they want we

Record of test between ~~Philadelphia~~ & Menlo Park on Edisons Speaking Teleph

Proff Barker at Philadelphia office ~~Mr~~ Batchelor at Menlo Park.

Barker wanted to test between 4 & 6 pm

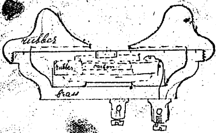
Batch sent word ~~that~~ he would be on No 7 at 4-30

5pm Waited till five pm then after great trouble got P on No 7 and then he apologized saying they were busy reporting big fire would be ready in a few minutes

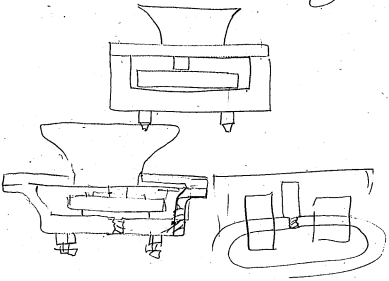
6pm Man in Philadelphia wanted to know what was the trouble and after a long while we told us that Barker was at UN & was connected through

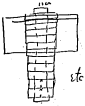
Speaking Telegraph March 29th 1878

J Kruesi

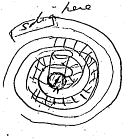

rubber
rubber
carbon
brass

Speaking Telegraph March 30th 1878





For receivers for Telephones



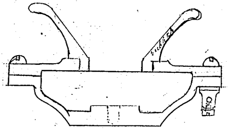
Portland

77

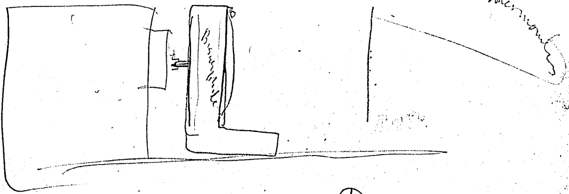
Speaking Telegraph April 1st 1878

Small Iron Transmitr.

J. Kruesi



Thermo Carbon Electrothermometer


Bismuth Plate

Porilounce

Port

Po

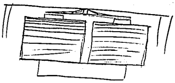
Po

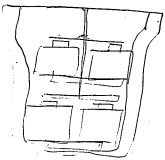
Po

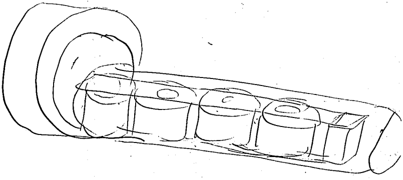
Po

Speaking Telephone

April 3 1878





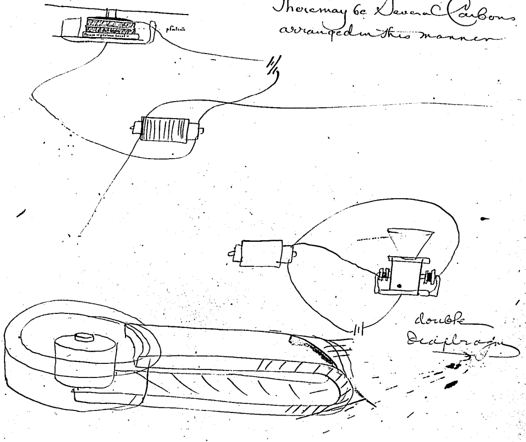


Speaking Telephone

April 3 1878 =

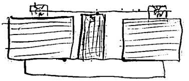
Chas Batchelor

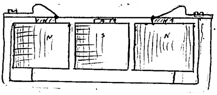
There may be Several Carbons arranged in this manner

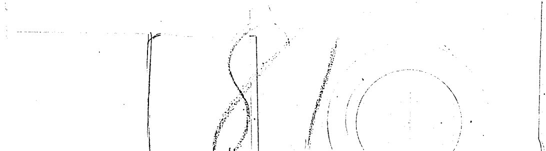

platina
double Diaphragm

J Kruesi

Speaking Telephone —
April 3rd 1878
TA Edison
Speaking Telephone

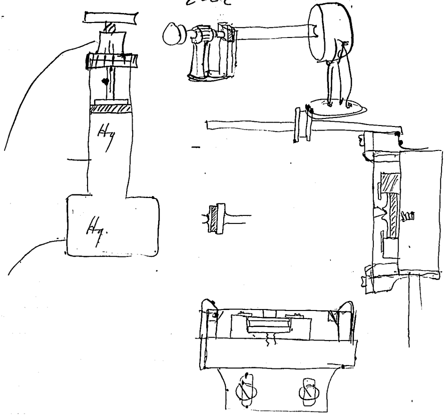






fo
fo

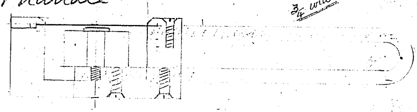
1 April 6 1878
TAE

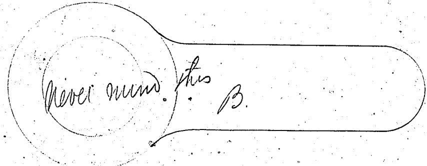


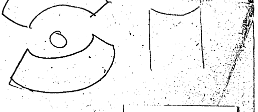
Speaking Telegraph
Apl 9th 1878

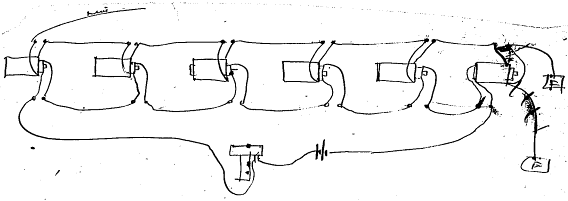
Chas Batchelor
J Kruesi

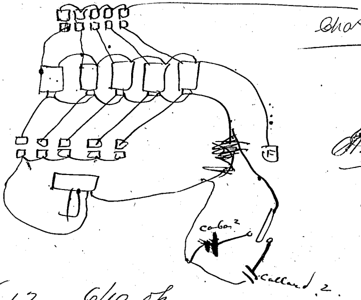
Kruesi. Make receiver like this: Permanent magnet 3/4 wide. leave ~~ham~~ magnet sticking out for handle




never mind this B.






line =
carbon 2
Callaud 2

Chas Batchelor

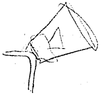
James Adams
J. MacKintosh

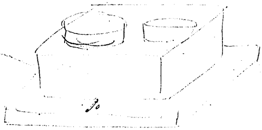
apr 12 1878

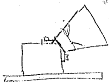
No 12 . 6/10 ohm
200 "

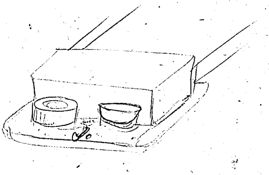
May 1 1878

Telephone





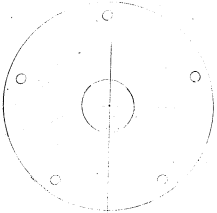


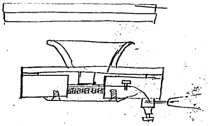


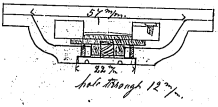
Speaking Telegraph
May 5th 1878.

J Kruesi

Chas Batchelor







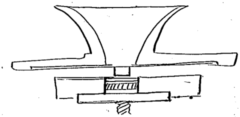
hole through 12 m/m.

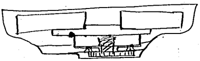
Chas Batchelor

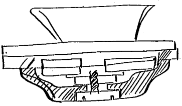
never
never

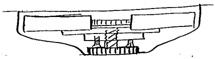
Speaking telephone. May 9th 1878

Chas Batchelor



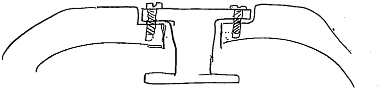


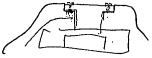


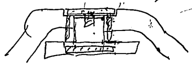


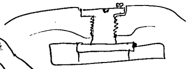
Speaking Telephone

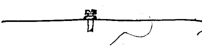
May 8 1878
T A Edison

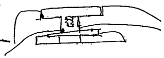


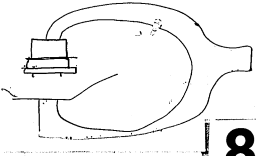






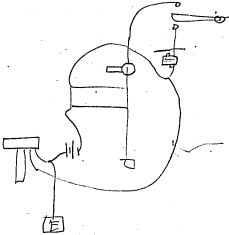


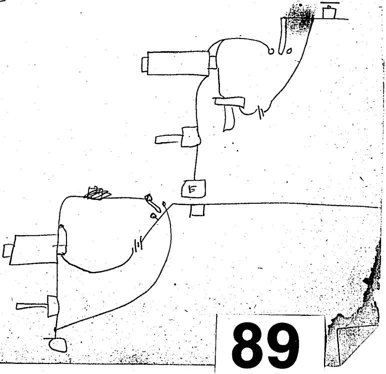




Telephone

May 17 1878.
T A Edison
Chas Batchelor
J Kruesi
M N Force





Telephone

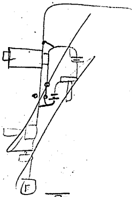
May 17 1878

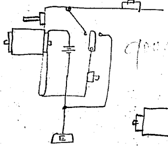
T A Edison

Chas Batchelor

J Kruesi

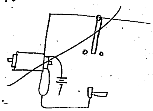
M. N. Force

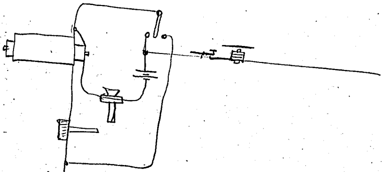


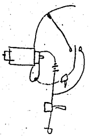


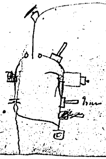
good

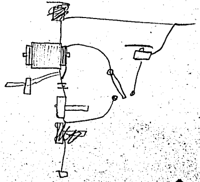
good







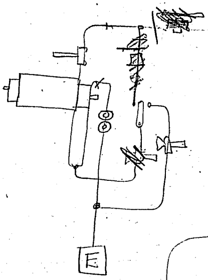


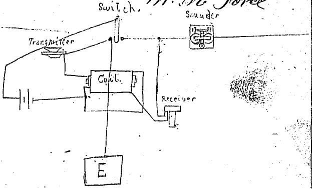


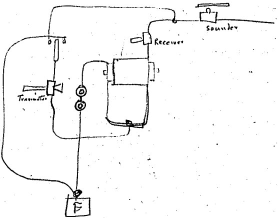
Telephn

May 17 1878

T A Edison
Chas Batchelor
J Kruesi
M. N. Force




Switch.
Sounder
Transmitter
Coil.
Receiver
E


Sounder
Receiver
Transmitter
E

Portland

Portland

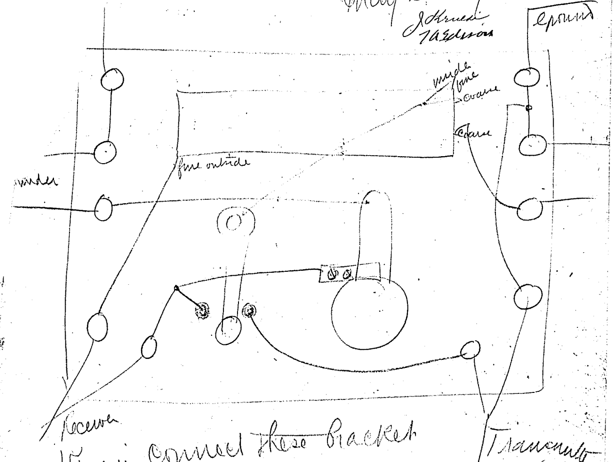
P P Por P Portland

Portland Me.

Speaking Telephone

May 20th 1878

J Kruesi
TA Edison


ground
inside fine
coarse
Coarse
fine outside
winder
Receiver
Transmitter

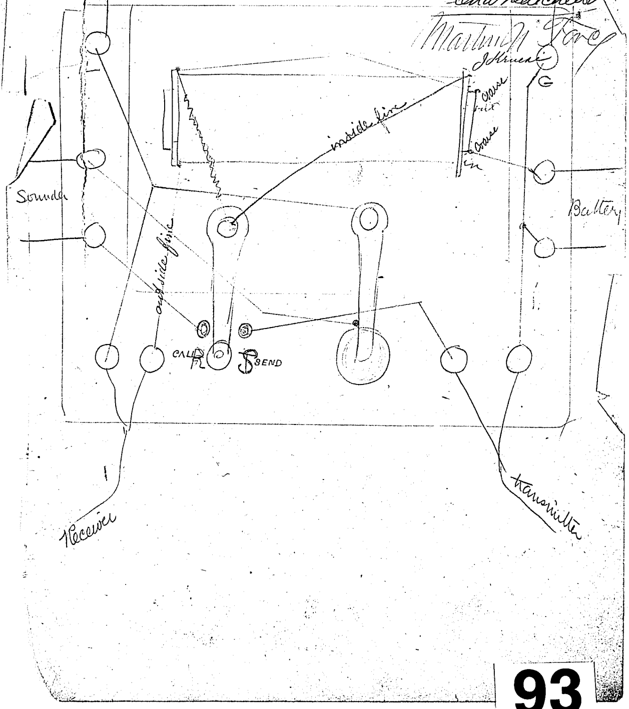
Kruesi connect these Bracket up this way

Chas Batchelor
Martin N. Force

92

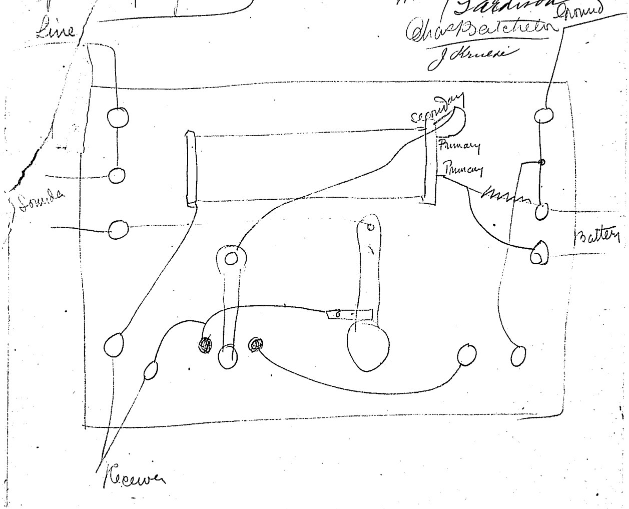
Speaking telephone

May 20th 1878
T A Edison
Chas Batchelor
Martin N Force
J Kruesi


G
coarse
fine
coarse
fin
inside line
Sounder
Battery
outside line
CALL
R
S
SEND
Receiver
transmitter

Speaking telephone

May 20 1876
T A Edison
Chas Batchelor
J Kruesi


Line
Ground
Secondary
Primary
Primary
Sounder
Battery
Receiver

Speaking telephone

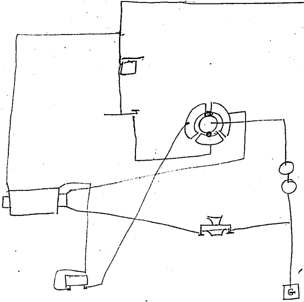
May 23 d 1878

Chas Batchelor

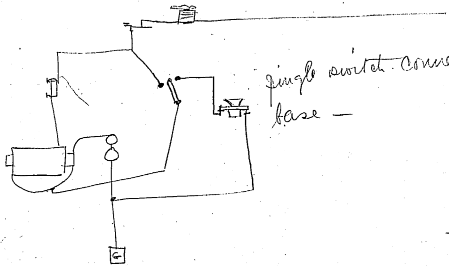
Martin N Force

J Kruesi

T A Edison

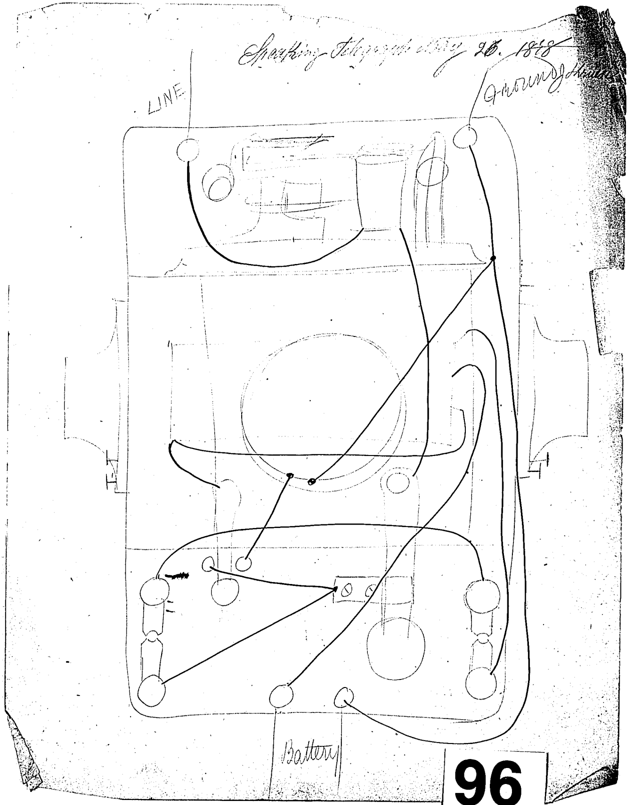


Bracket connection



Jingle switch connection for base —

Speaking Telegraph May 26. 1878

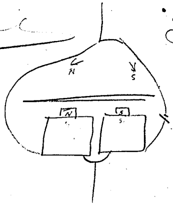

LINE
Ground Line
Battery

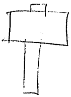
Telephone

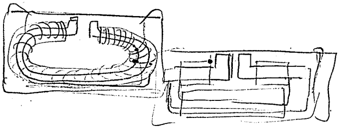
May 26 1878

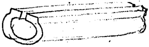
T A Edison

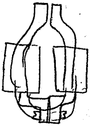
Chas Batchelor

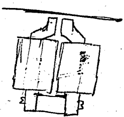






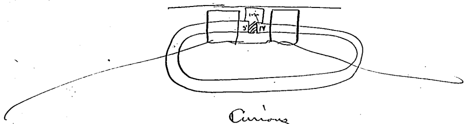






F. Upton

T A Edison
May 26 1878



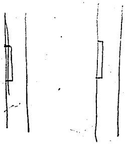
Curious

Portland Portland

P

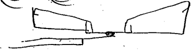
Portland

Courtland Portland



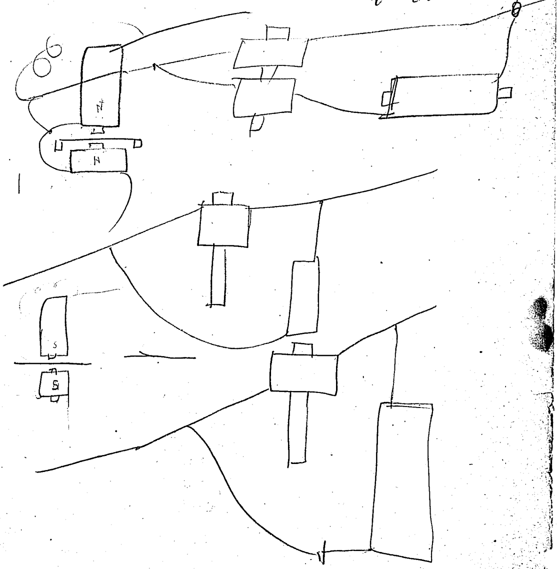
Courtland Street

Street



Telephone

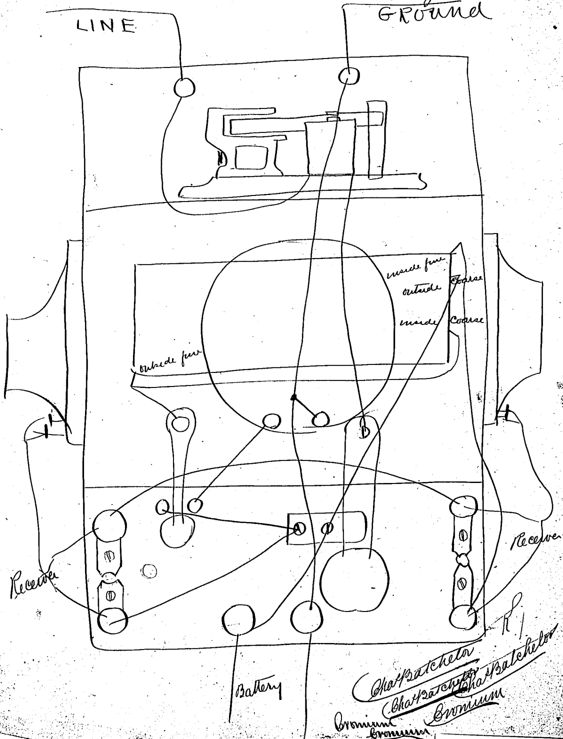
May 26 1878
TA Edison



Speaking telephone

May 27 1878 Chas Batchelor

J Kruesi


LINE
GROUND
inside fine
outside Coarse
inside Coarse
outside fine
Receiver
Receiver
Battery

K 1

Chas Batchelor

Chas Batchelor

Chas Batchelor

Cromium

Cromium

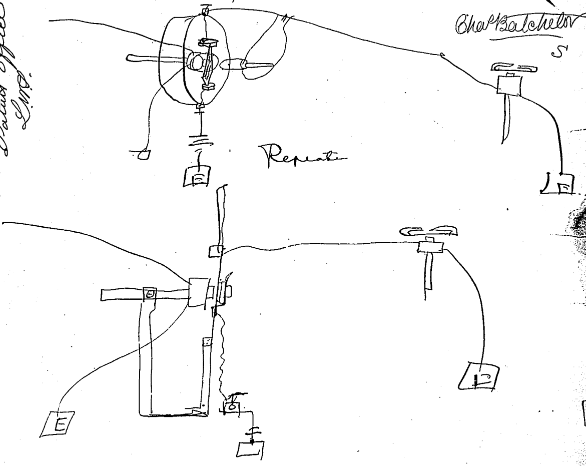
Cromium

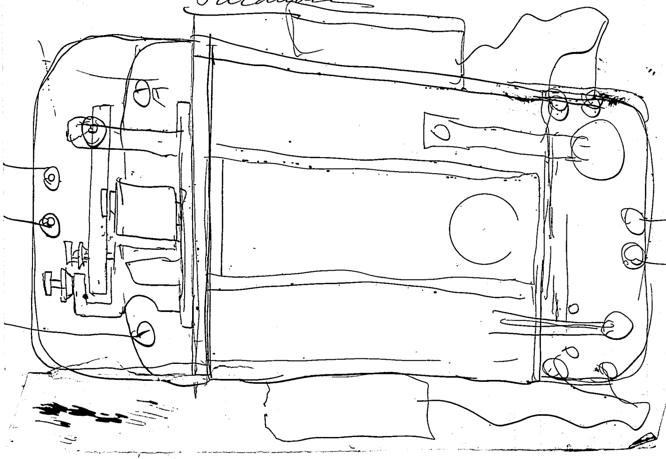
Edison — Short
Exhibit B.
SLG

May 28 1878

T A Edison
Chas Batchelor

Original of which this is a Photolithograph sent to Patent Office
L.W.S.


S
Repeater
E
E
E
E



May 29 1878
T A Edison

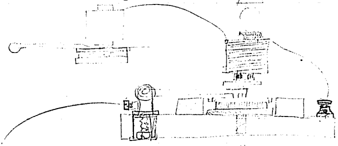
T. A. EDISON.

Menlo Park, N. J., 187

T A Edison

May 1878

Chas Batchelor



Made this
worked ok
Loaned to May
at Scranton

Telephone

Chemicals & Carbons June 2nd 1878

Gum Amber –	could hear vibrations when other receiver was cut out [illegible] with Diaphragm
" Sandarach	louder than amber there is not much difference when took off the rubber plug and adjustment ~~not~~ does not materially change the strength
" Arrowroot	weaker, in contact and not
Paris Green	do, stronger when not in contact
Borax	Fair
Indian Hemp	very weak
Sulphate Iron	weak
Starch	medium
Chalk	ditto
Sal Amoniac	—
Litherage –	weak
Asphaltum	ditto
Sulphur –	"
Gum Arabic –	very weak
Benzoin –	weak
Carbon –	medium, louder
Snuff	ditto
Bk oxd mang	weaker
Gum Ammoniac	medium
Shellac	ditto
Sago	—
Damar	ditto
Gum Tragacanth	
Brass filings	ditto
Brazil wood	ditto, little louder
Black lead.	ditto
Zanzibar	very [illegible], [illegible]
Chlorate potash	ditto
Sulp. Copper	ditto [illegible]
ferrid cyanide Potash	very loud
Bronze	loud
Animal charcoal	—
~~aspho~~ Asbestos	Fair
Madder	loud

Telephone

Tannin ——— ——— Fair
Bromide Potash ——— ditto
Whiting ——— Fair
Salt ——— ~~nothing~~ Fair
Pattasii Chloridum Fair
Chrome Alum Fair
June 3rd Nitrate ammonia
Gamboge Fair
Kaoline Fair..
Oxolic Acid .. Fair
Argals .. Fair, is Rougher than others when touching the diaphr
Bi carb. Potash Fair
Ferro Cyanide Potash Fair
Bi chromate Potash Fair
Tripoli Fair
Carb Soda Fair
Rotten Stone Fair
Citric acid Fair in better 11
Arsenious weak
Dextrine Fair to good
Tumeric Fair
Silicic Acid Fair
Brimstone Fair
Fire clay Fair
Phosphate lime - Powd. varys greatly in adjustment -
Tartrate Soda - Fair
Permanganate Potash (doubtful) Fair
Nitrate Strontia Fair
Chloride Calcium
Bi Carb Soda Fair

Cyanide Potash Fair

Sumac Fair

Cudbear - Loud -

Cam wood Fair

Sulphate Baritya - Very loud almost as loud as the standard and increases and decreases in adjustment which was not noticeable in the yesterdays —

Fluor Spar - Fair

Iodide potassium Fair

Stearic Acid — Fair

Phosphate Soda do

Ammonic Acid do

Sesque Oxide Lead do I notice that in taking out core it it is slightly heated

Ferro Cyan Iron do acts slightly [illegible]

Sesque oxide ~~[illegible]~~ lead - by inserting therm in ~~the~~ Sesq - ox Pd. which is contained in Glass core raises from normal 80 - to 101 - with two cells battery - the same tried with dextrine raises to 95 - this may be due to the differand conductivity of the same of the heat generated from the spool - the thermomitor inserted in the Telephone spool raises to 90

Woodbridge Clay - Fair

Pumice Stone do

Ferro Cyan Copper do

Sulphate Antimony do

Gallic Acid do

Soap Stone do

Boron Chloride do

Black Flux do

Fine Cast Iron filings ~~do~~ Loud, it is Louder when in contact with the diaphram

Iodide Lead Fair

Bi Tartrate Potash Fair

Prussian Blue Fair

Acetate Soda Fair

Sulphide Antimony Fair [illegible]

[illegible]senic Acid Fair [illegible]
Amalgam Fair
[illegible] Marble Fair
[illegible] Fair [illegible]
[illegible] Fair
[illegible]ycopodium Seed weak
[illegible]phate Potash Fair
[illegible]iline Red Fair
[illegible] Copper Fair
[illegible]n Pyrites Fair
[illegible] Fair
[illegible] Tin — [illegible]

[illegible] this [illegible] Ride
[illegible]d. by [illegible] on heating —
[illegible] — Fair
[illegible] Oxide [illegible] — Telephone [illegible]
[illegible]
[illegible] 90

[illegible] with [illegible] the degrees [illegible]

[illegible] Oxide Iron [illegible] the [illegible]

[TRACING]

Atomonic Acid	Fair – attracts particales cant try experiments without further
Amalagan	Fair
Powdered Marble	Fair
Per Oxide Iron	Fair, louder when touching diaphram
Anthracine	Fair
Lycopodium Seed	weak
Sulphate Potash	Fair
Aniline Red	Fair
Oxide Copper	Fair
Iron Pyrities	Fair
Litmus	Fair
Protochloride Tin	– Loud – it is louder when in contact with diaphr

Sesque Oxide Iron Fair – This work the same way as Sesque Oxide Lead. by the glass ~~core~~ heating –

Sulphate Murcury – Fair

Sesque Oxide Lead – Telephone spool 26 ohms with Se Ox Id in place of core and ~~themom~~ placed on top of it and raises from 78 Degrees to normally position to 90

10
3
18
6
24

5
18
4
22
4
6

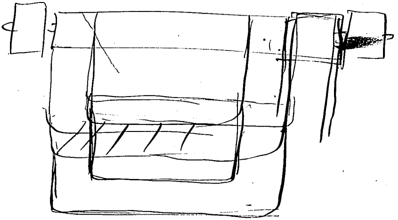
Sesq Ox Ld when placed in glass ~~tube~~ with ~~themom~~ inserted – and two permanent magnets placed on Either side will show 1 1/2 degrees of heat

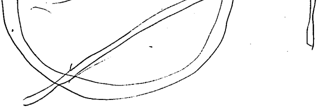
---

Per Oxide Iron will show 1/2 degree heat

June 7, 1878

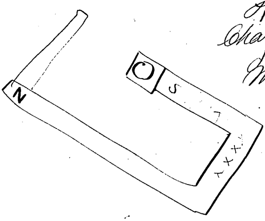
Telephone ___ . Chas Batchelor
J Kruesi
M. N. Force
T A Edison





Telephone June 7, 1878

T A Edison
Chas Batchelor
J Kruesi
M. N. Force

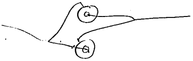


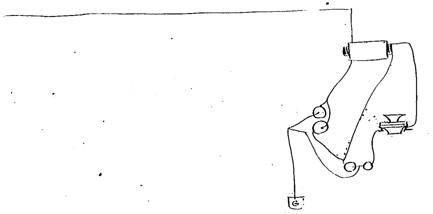
Speaking Telephone

June 7th 1878

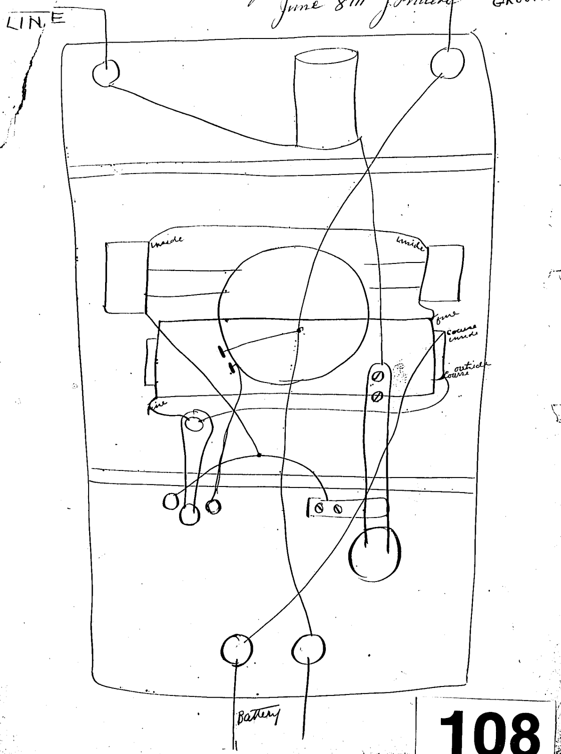
Chas Batchelor

J Kruesi

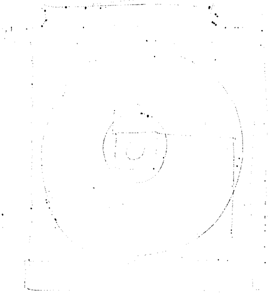




Conections for Telephone
June 8th J Kruesi


LINE
GROUND
inside
inside
fine
course inside
outside course
fine
Battery

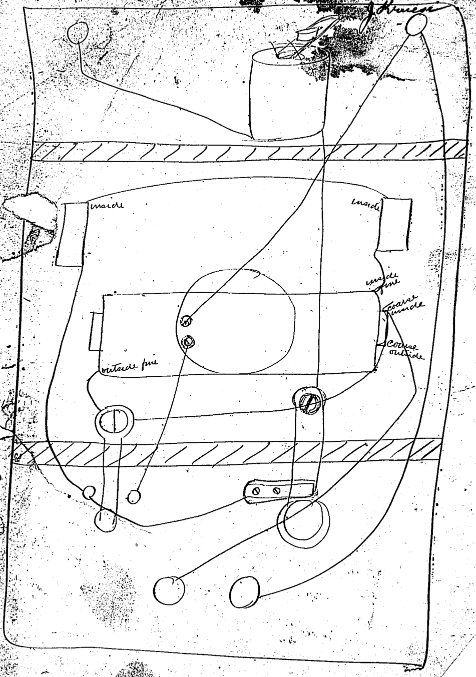
[illegible] June 8th 1838
[illegible]



S.105

Speaking telephone

June 9th 1878
Chas Batchelor
J Kruesi

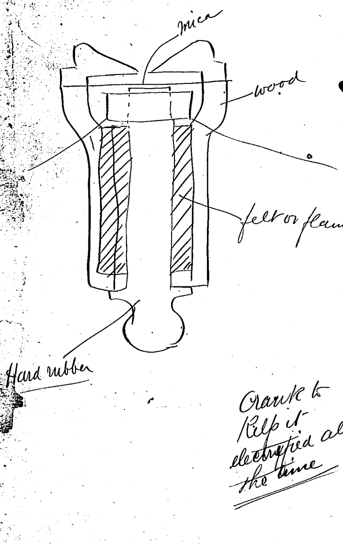

inside
inside
inside fine
coarse inside
coarse outside
outside fine

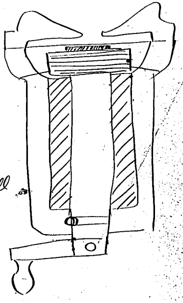
Speaking telephone receiver

June 10th 1878

Chas Batchelor

J Kruesi

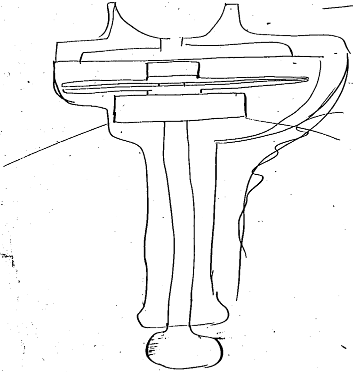

mica
wood
felt or flannel to electrify the core
Rubber
Hard rubber


Crank to keep it electrified all the time

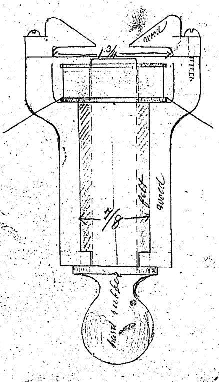
Speaking telephone receiver June 10th 1878

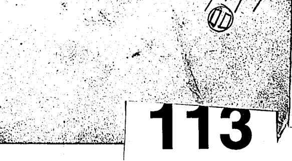
Chas Batchelor

J Kruesi



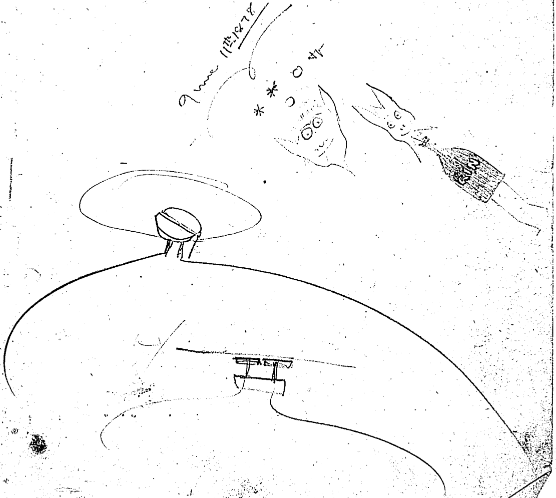
Speaking Telephone June 11
J Kruesi


wood
3/4
felt
wood
7/8
hard rubber

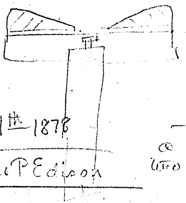


Telephone

June 11th 1878


June 11th 1878

Telephone diaphrams of mica rubbed with Emery paper until gloss is gone
Sulphate Mercury rubbed on rough side



works fair is not Quite as loud as carbon telephone — does not make a very great difference when two wires or one

June 11th 1878
Chas P Edison

Now are our brows crowned with laurel wreaths our brows crowned with laurel Now is the winter of our discontent made glorious summer by this son of York and all the clouds that lower on our house are in the deep bosom of the ocean buried

Mary had a little lamb its fleece as white as snow

B. Boston

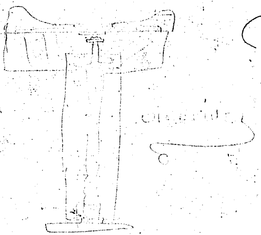
Boston Boston Boston

Boston Boston

June 10th 1878

T A Edison

Telephone



June 10th 1878

ulphate mercury	nothing
sque oxide Lead	very good
xide copper	Fair
tmus	First Rate
sque Oxide Iron	A1 Fair
ron Pyrites	Fair
ulphate Potash	Fair
ycopodium	weak
rotochloride Tin	

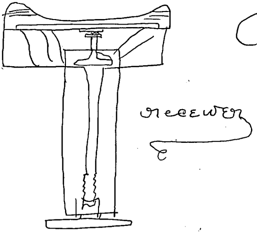
Continued on ~~page 10~~

[TRACING]

June 10th 1878

T A Edison

Telephone



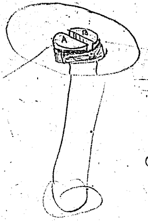
June 10 # 1878

Sulphate mercury	nothing
Sesque oxide Lead	very good
Oxide copper	Fair
Litmus	First Rate
Sesque Oxide Iron	Fair
Iron Pyrites	Fair
Sulphate Potash	Fair
Lycopodium	weak
Protochloride Tin	

Continued on page 10

~~[illegible]~~

A and B with space between and insulated by with differant chemicals inserted bet_ a + B —



TA Edison

June 12th 1878

Sulphate Murcury	slight liberation	
13th Benzoic acid	weak	con
Ferro Cyan Copper	Fair	non Con
Sulphate Antimony	weak	—
Ammoni Citrate Iron	weak	non Con
Barate Baryta	Fair	" "
Burnt Umber	weak	" "
Fluor Spar	Fair	" "
Indigo	Powder	" "
Arsenate Ammonia	very weak	" "
Bitartrate Potash	Fair	" "
Arsenate Copper	Fair	" "
Carb Potash	very weak	con
Sulphate Calcium	" "	Non Con
Silicic Acid	" "	" "

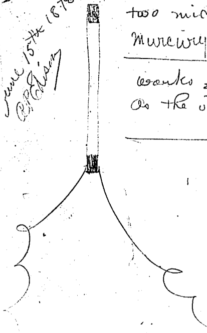
elephone

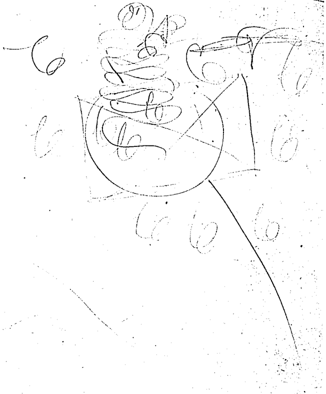
911

June 15th 1876
T A Edison

two mica diaphrams treated with sulphate Murcury -

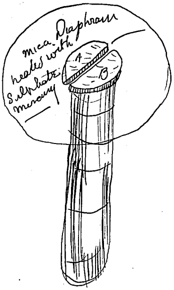
works ~~[illegible]~~ very good - about half as loud as the vibrations of the Telephone





Sulphate Zinc	FAIR	nc
Citric Acid	weak	nc
Tannin	Fair	nc
Carbon	nothing	Con
Borax	FAIR	n.c.
Damar	Fair	n.c.
Madder	weak	n.c.
Chlor Potash	Fair	nc
Paris Green	Fair	nc
Tripoli	weak	nc
Tumeric	very weak	nc
Blk ox Mng	ditto ditto	nc
Whiting	Fair	nc
Milk Sugar	Fair	nc
Rotten Stone	Fair	nc
Sulph Copper	Fair	n.c.
Carb Soda	Fair	nc
Nutgalls	weak	nc
Arsenious Acid	Fair	n.c.
Bronze	nothing	Conductor

[TRACING]


mica Diaphram heated with Sulphate mercury
A
B

~~the~~ New Telephone Receiver
June 16th 1878
Chas P Edison

A and B B poles of battery with spermaceti inserted between — with mica diaphram treated with Sulphate mercury

the above is fair to loud — and a little louder than with mica diaphram with platina point

no apparant change when spermaceti is out

With diaphram without any Sulphate of mercury but a very small amount of vibration can be detected

Black Flux —	Fair —	non Con
Soap Stone	Fair.	" "
Woodbridge Clay	Fair	" "
Phosphate Soda	weak	" "
Ferro Cyan Iron	ditto	" "
Boric Acid	ditto	" "
Protochloride Tin	very very weak	Conductor
Oxide Copper	Fair	non Con
Sulphate Potash	~~very weak~~ Fair	non Con
Chloride Barium	very weak	" "
Lycopodium Seed	Fair	" "
Sesqui Oxide Lead	Louder	" "
Arsenious Acid	Fair	" "
Pepper	Fair	" "
Carb Copper	weak	" "
Iodide Lead	Fair	" "
Litherage	Fair	" "
Bicarb Potash	Fair	" "
Grape Sugar	weak	" "
Bichromate Potash	Fair	" "
Ferrid Cyan Potash	Fair	" "
Camphor	Fair	" "
Black lead	nothing	Conductor
Silicic Acid	Fair	non Con
Salt Petre	nothing	"

[illegible] S.P., Try this again—

Bromide Potassium	Fair	Non Condu
Sal Ammoniac	N ~~Fair~~ 9	Conduct
Argols	Medium Loud	Non Con
Asbestos	Very Weak	
Chromic Alum	Fair	
~~Gelatine~~	Weak	"
Protosulphate Iron	— Fair	"
Dextrine	— Fair	"
Potassium Chloridum	— Fair	"
Nitrate Ammonia	— very Weak	"
Arrow Root	— Fair	"
Sulphur	— Weak	"
Starch	— Fair	"
Animal Charcoal	— Fair	"
Brass filings	— Nothing	Conduc
Iron Protosulphate	— Weak	Non
Spermicita	— Fair to loud	"
Cocoa Butter	— Fair	
Scotch Snuff	— Fair	"
Ferrid Cyan Potash	— Fair	"
Chalk	— Fair to loud	"

[TRACING]

Bromide Patassium	Fair	non Conductor	
Sal ammoniac	Nothing	Conductor	
Argols	medium Loud	non Conductor	
asbestos	Very Weak	"	"
Chromic Alum	fair		
Kaoline	Weak	"	"
Protosulphate Iron	— Fair	"	"
Dextrine	— Fair	"	"
Patassi Chloridum	— Fair	"	"
Nitrate Ammonia	— Very Weak	"	"
Arrow Root	— Fair	"	"
Sulphur	— Weak	"	"
Starch	— fair	"	"
Animal Charcoal	— Fair	"	"
Brass filings	— Nothings	Conductor	
Iron Protosulphate	— Weak	non	"
Spermacila	— Fair to loud	"	"
Coca Butter	— Fair	"	"
scotch Snuff	— Fair	"	"
Ferrid Cyan Potash	— Fair	"	"
Chalk	— Fair to loud	"	"

Telephone Speaking — June 15th 1878

Chas Batchelor

Try Static Receiver as transmitter

Make diaphragms of different substances

Try Ferrid cyanide of potash, Bronze

Madder, Sulphate Baryta

Sanguine oxide iron, Mica diaphragm

rubbed with Sulphate Mercury

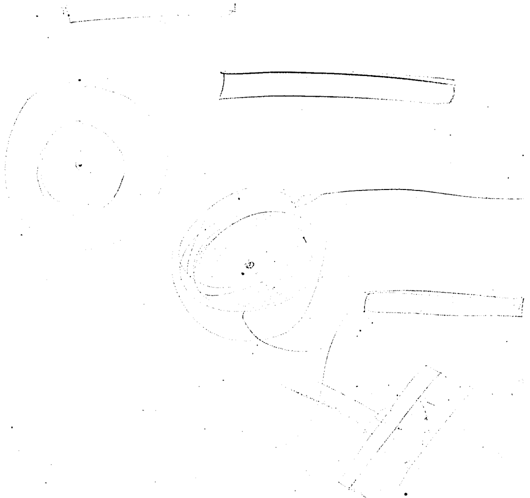
In receiver [illegible] [illegible]

Coil in [illegible] [illegible] battery

Speaking telephone
New Receiver

June 16th 1878

Chas Batchelor



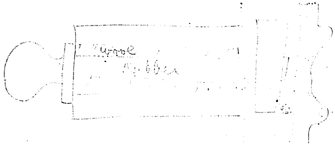
Speaking telephone

June 17 1878

New Receiver Static.

Chas Batchelor

[illegible]



/ The above as receiver, mica diaphragm nothing at all nor as a transmitter on line or in primary.

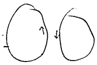
Diaphragms tried of

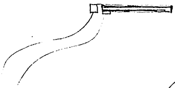
Sheet Brass
Mica
Tinfoil
Iron
Hard rubber
Soft rubber
Paraffin paper
Shellaced "
Cork thick
" thin
Painter paper
Leather
Copper foil

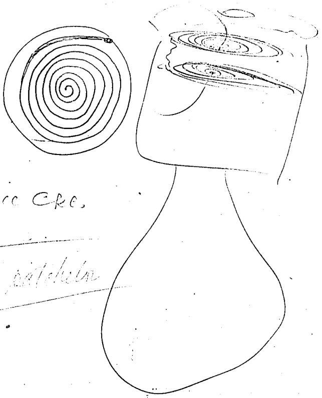
Felt
Thin wood

No result

Speaking Telephone June 17 1878
T A Edison







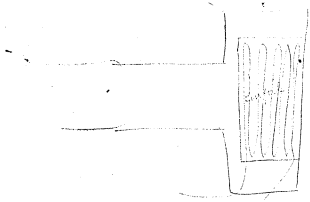
Attraction of parallel circ.

[illegible]

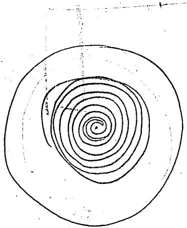
"Speaking telephone" June 18th 1878

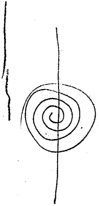
Chas Batchelor
Geo E. Carman

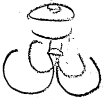
New Receiver.



Take some of the ½ inch tissue paper and paste a thin strip of tinfoil on it so as to make a long metallic band this is to be laid ~~thus~~ so as to make a number of planes [illegible] use as a condensor



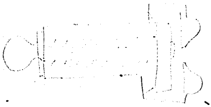




Speaking telephone
New Receiver

June 18th 187

Chas Batchelor
J Kruesi



Took core out put in [illegible] mica diaph.
Receiver nothing. Trans. nil

Put in Copper foil diaphragm and used as receiver with

Hard rubber core — nothing
Copper core — nothing
Steel core (mag) nothing
Iron " nothing.

Put in Iron diaphragm and used as a receiver with

Copper core — very low but good
Iron core — good but low.
Hard rubber core —

I find I can get it without any core just with a diaphragm

Speaking telephone - June 18th 1878

New Receiver

Chas Batchelor

Make receiver of Bell and core of small discs of ferrotype plate punched out (Given to Force)

Make receiver of two ~~diaphragms~~ plates with spirals of tin foil in order to see if there is anything for us in parallel circuits

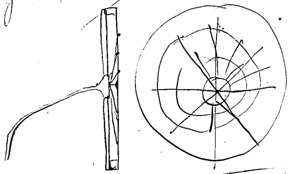
Gave to Carman to make

Make receiver

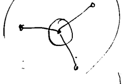
T. A. EDISON.

Menlo Park, N. J., 187

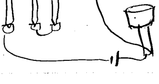
Aerophone
June 19 1878
T A Edison



Telephone



Portland,
Portland
Portland
Portland
Portland



12/14

514 12
470 62
44 50

Chas Batchelor

Chas Batchelor

Chas Batchelor

Chas Batchelor

Chas Batchelor

Chas Batchelor

Chas Batchelor

Chas Batchelor

Chas Batchelor

Chas Batchelor

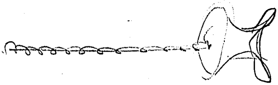
Chas Batchelor

Chas Batchelor

Speaking Telephone
New Receiver

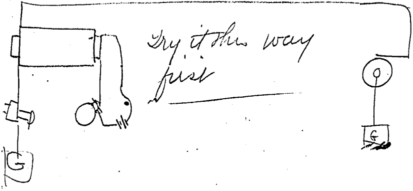
June 19th 1878

Chas Batchelor



Iron wire wound with copper and ~~the end~~ of wire fastened to a diaphragm

Electromotograph Receiver



Try it this way first

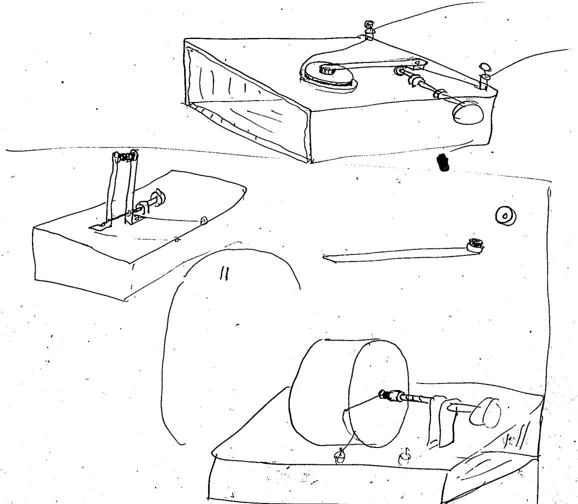
Tel

Microphone

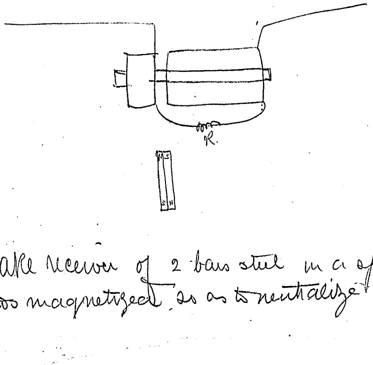
June 19. 1878

TAE

Chas Batchelor



June 19th 1878
Chas Batchelor



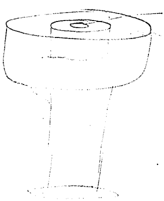
Make receiver of 2 bars steel in a spool with the ends magnetized so as to neutralize each other

Speaking Telephone June 19th 1878

New Receiver Chas Batchelor

Martin N Force

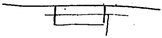
Force make this:-



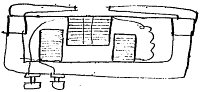
Core made up of a number of discs of ferrotype plate and dropped in one on top of the other do not scrape the shellac off them I want them insulated from one another.

Telephone

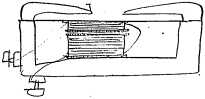
June 21 1878.
T A Edison

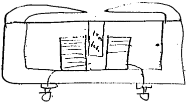


Receiver worked by mutual attraction of Coils one fixed & the other on the diaphragm— both in same circuit,



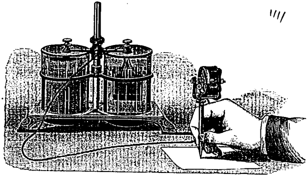
I will also mention that the fixed one may be placed in a local circuit





Suction or axial magnet

ELECTRICAL PEN AND DUPLICATING PRESS.

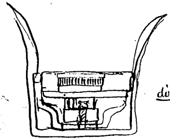


CHAS. BATCHELOR, General Agent for Foreign Countries.
P. O. Box 3207.

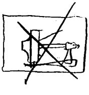
New York, June 21 1878

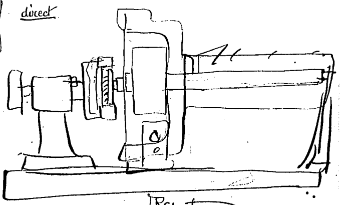
T. A. Edison

Suggestions

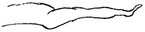


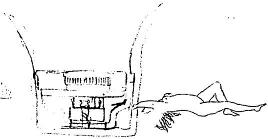
direct

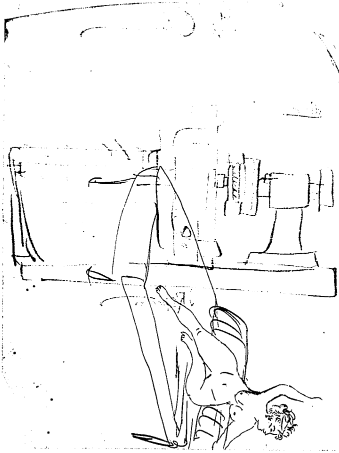




Repeater



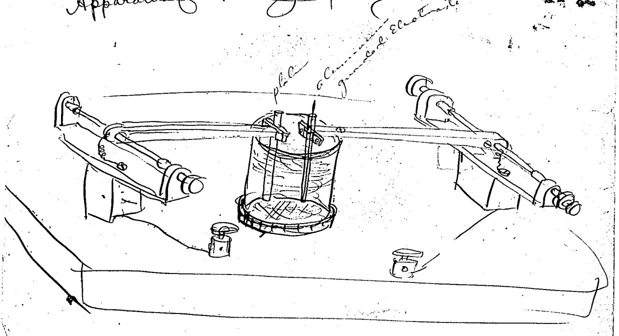




June 21 1878
T A Edison

J Kruesi

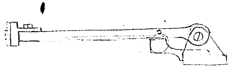
Apparatus for Polarizing a Telephone line

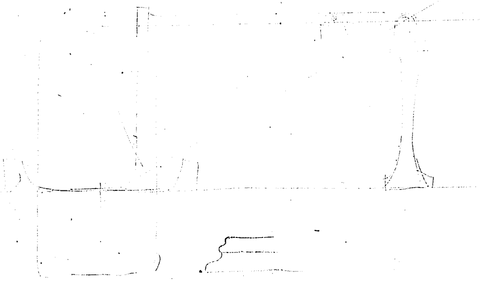

plat
aluminium
ground Electrode

for Polarizing a Telephone
Arm

June 22 1876

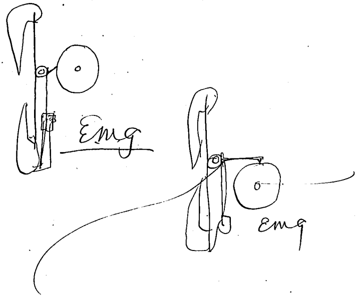
Chas Batchelor
J Kruesi

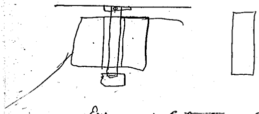


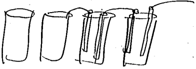


Telephone

Jan 23 1886
T A Edison





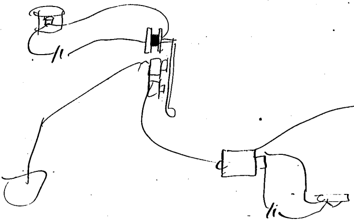


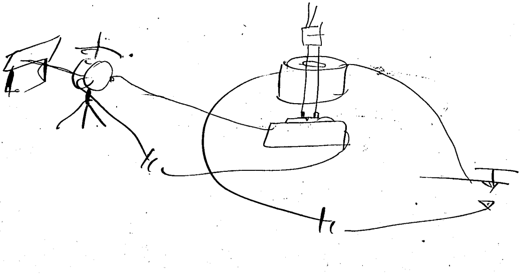
Expansion & Contraction of cylinders in an Electric field They are connected to a diaphragm & serve to give motion to it =

Multiple Aluminum Platina polarizers for telephone Ckts =

Telephone

June 23 1878
T A Edison





Telephone

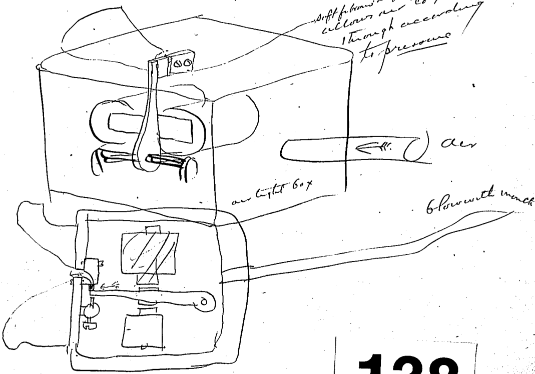
air

June 23 1878

T A Edison

Chas Batchelor

J Kruesi


air
air tight box
blower with winch

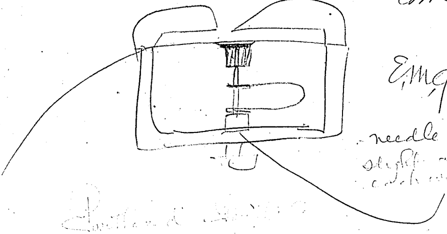
Soft fibrous substances allows air to go through according to pressure

Telephone Receiver

June 29 1878

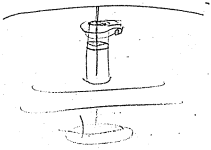
Chas Batchelor
J Kruesi
M. N. Force
T A Edison

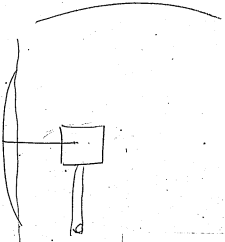
E.M.Q



needle penetrating a slight amount of [illegible]

[illegible]





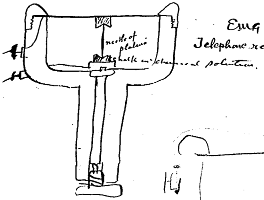
Personally appeared before me this day of
18 , the said Thos. A. Edison,
Chas. Batchelor, John Kreuzi, and Martin Force,
and acknowledged the above to be their signature

Notary Public.

Telephone receiver

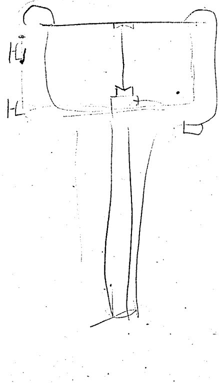
June 29

TA Edison


needle of platina
chalk in chemical solution.

EMG or other action Telephone receiver

Chas Batchelor
J Kruesi
M N Force
T A Edison



Personally appeared before me this day of
18 , the said Thos. A. Edison,
Chas. Batchelor, John Kreuzi, and Martin Force,
and acknowledged the above to be their signature

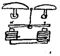
Notary Public.

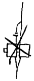
T A Edison

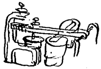
July 2 1878

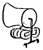
T A Edison

Telephone

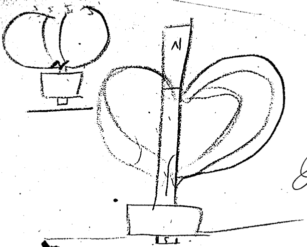




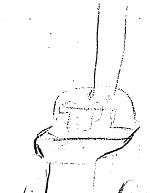




Chas Batchelor
J Kruesi
M N Force
T A Edison



July 10 1878
T A Edison
T A Edison
Chas Batchelor
J Kruesi
M N Force

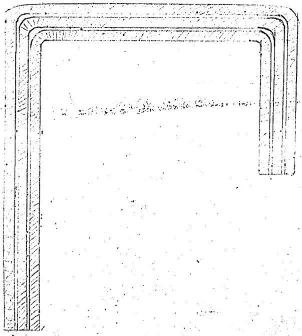


T A Edison

July 10 1878
Chas Batchelor
J Kruesi
M. N Force
T A Edison

25

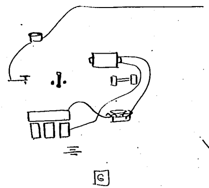
"Speaking one July 19th 1878
J Kruesi

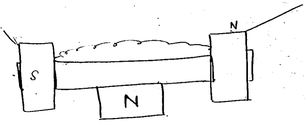


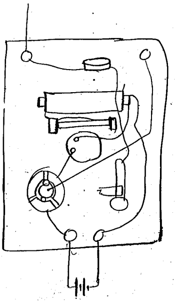
Speaking Telephone

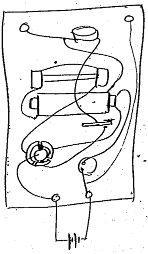
July 23rd 1878

Chas Batchelor
J Kruesi



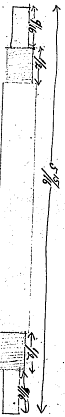


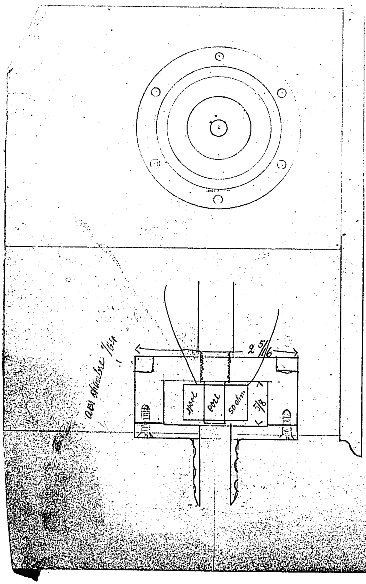




Speaking Telephone Aug. 11th 1878
~~New~~

J Kruesi


9/16
1/2
5 15/16
1/2
9/16

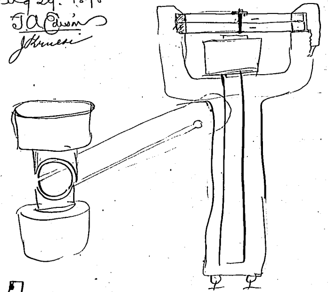

Abs Ebonite 1/64
2 5/16
spool
core
50 ohm
5/8

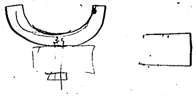
Telephone

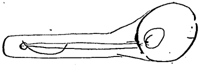
Aug 29. 1898.

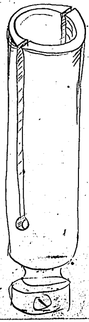
T A Edison

J Kruesi

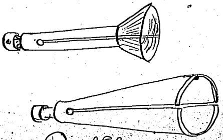








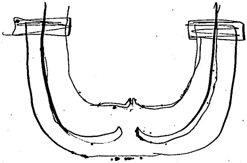
Resonant Tuning Fork.

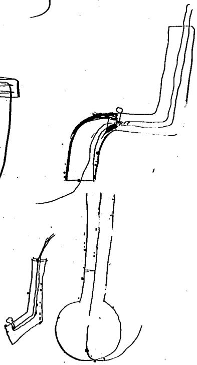


Funnel fork.

Aug 31 1878.

T A Edison





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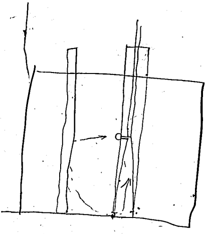
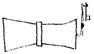
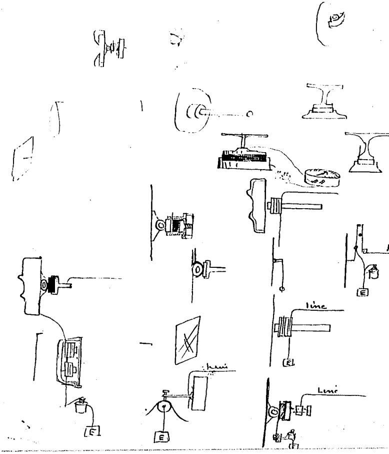


T A Edison

Chas Batchelor
previous to Sept 14th 1878
J Kruesi





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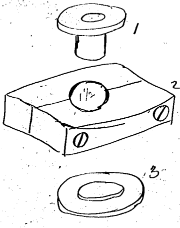
elephone

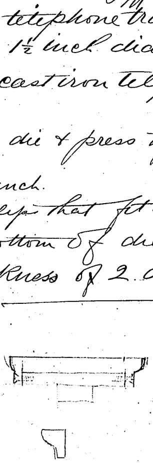
Sept. 14th 1878
T A Edison
Chas Batchelor
J Kruesi
M N Force

ruesi; have made a telephone transmitter with a carbon button $1\frac{1}{2}$ inch diameter, or as large as our cast iron telephones will allow.

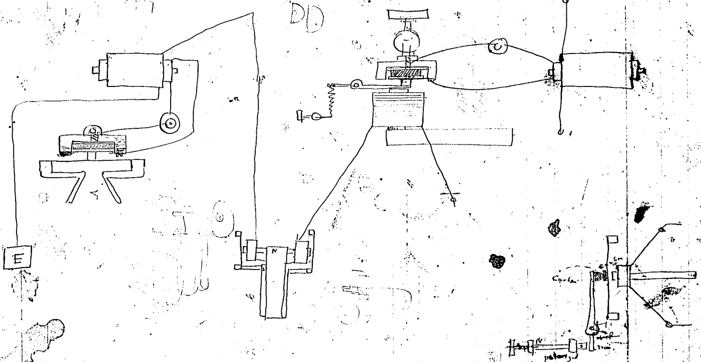
and make a brass die & press to press one up so:



1 is Punch.
2 is clip that fit around 3
3 is bottom of die.
Thickness of 2 about $\frac{3}{4}$ inch



New Receiver


DD
E
N
Carbon
N
patent
Iron

(Telephone)

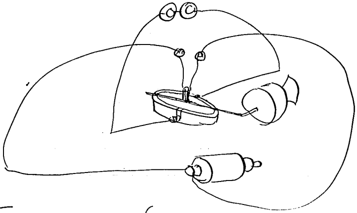
Model for patent. Sept 27, 1878.

T A Edison

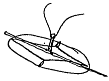
Chas Batchelor

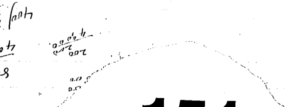
J Kruesi

M N Force



Telephone,
Sept 27 1878
T. A. Edison





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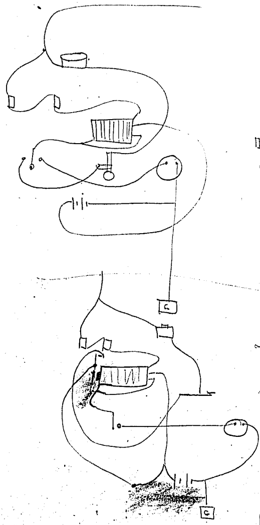
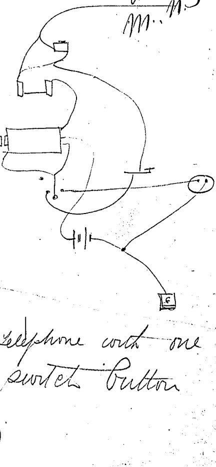
Speaking Telephone

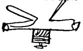
Sept 27th 1878
Chas Batchelor
J Kruesi
TA Edison
M. N. Force



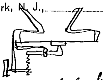


Telephone with one switch button

T. A. EDISON.



Menlo Park, N. J., ...187



Telephone

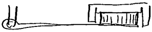
Sept 27 1878

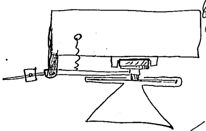
T A Edison

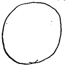
J Kruesi

Chas Batchelor

M N Force







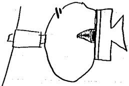
Personally appeared before me this . da

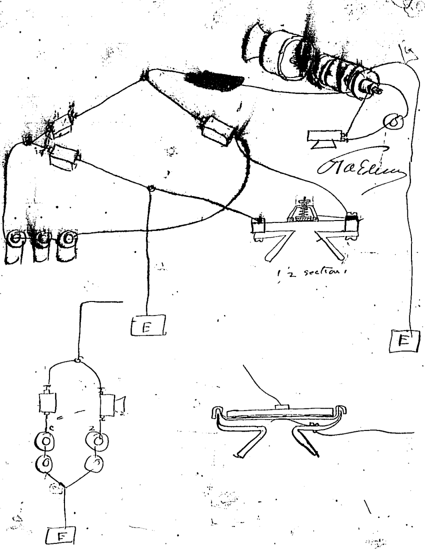
18 , the said Thos. A. Edi

Chas. Batchelor, John Kreuzi, and Martin Fo

and acknowledged the above to be their signat

Notary Public.

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F

T A Edison

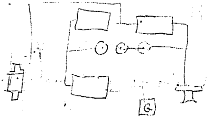
Model for Kreuzi to make

September, 27. 1878 Chas Batchelor

J Kruesi

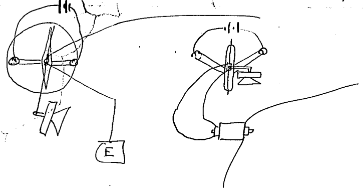
M N Force

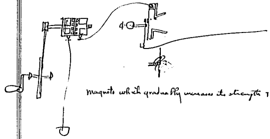
154


G

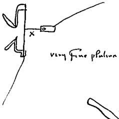
Telephone Caveat.

Sept 24 1878
T A Edison

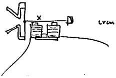




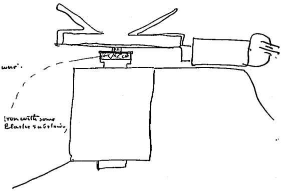
Magneto which gradually increases its strength & Ross trans



very fine platina wire; expands & contracts by passage of current



Iron wire.



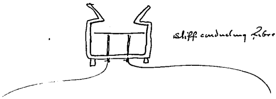
Iron with some Elastic substance,

(2)

Telephone Caveat,

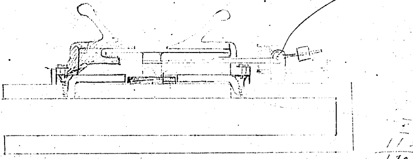
Sept 27 1878

T A Edison


stiff conducting fibre,

Tele-Microphone Sept 27th 1878

J Kruesi
G Carman
M N Force
Chas Batchelor



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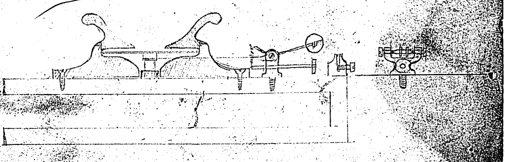
T A Edison



Telephone

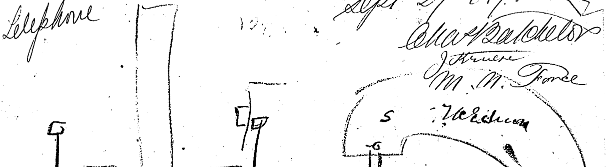
Sept 27 1878

Chas Batchelor

J Kruesi

M. M. Force

T A Edison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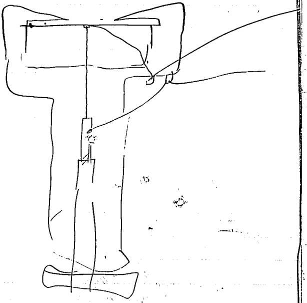
T. A. EDISON.

Menlo Park, N. J., 187



Oct 2 1878 T A Edison
Chas Batchelor J Kruesi
Stockton L Griffin
M. N. Force

Platina Telephone received passage of the current heats the ~~[illegible]~~ platina & Expansion work the diaph

Personally appeared before me this day of 18 , the said Thos. A. Edison, Chas. Batchelor, John Kreuzi, and Martin Force, and acknowledged the above to be their signature

Notary Public.

Personally appeared before me this day of 18 , the said Thos. A. Edison, Chas. Batchelor, John Kreuzi, and Martin Force, and acknowledged the above to be their signature

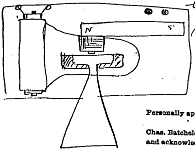
Notary Public.

T. A. EDISON.

Menlo Park, N. J., Oct 8th 1878

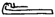
Telephone

J Kruesi
Chas Batchelor
G E Carman
M N Force
TAE



Personally appeared before me this day of 18 , the said Thos. A. Edison, Chas. Batchelor, John Kreuzi, and Martin Force, and acknowledged the above to be their signature

Notary Public.



T. A. EDISON.

Telephone

Menlo Park, N. J., Oct 8. 1878

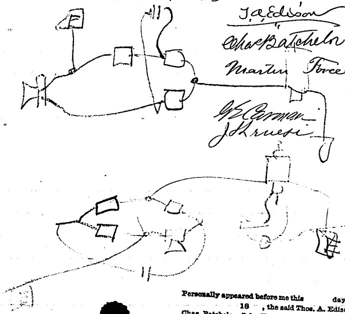
T. A. Edison

Chas Batchelor

Martin Force

G E Carman

J Kruesi



Personally appeared before me this day of 18 , the said Thos. A. Edison, Chas. Batchelor, John Kreusi, and Martin Force, and acknowledged the above to be their signature

Notary Public.

T. A. EDISON.

Menlo Park, N. J., Oct 9th 1878

T A Edison

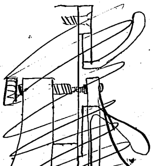
J Kruesi

Geo E Carman

Chas Batchelor

M. N. Force

Kruesi Will you make an instrument like this.

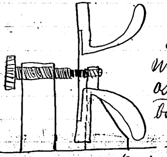


A diaphragm with platina point on both sides and a screw on both sides in rigid heavy bearings that will not vibrate with diaphragm

diaphragm size of our transmitter diaph.

make points as heavy as the largest platina

both screws adjustable



points as flat as possible

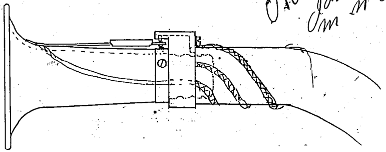
Personally appeared before me this day of 18 , the said Thos. A. Edison, Chas. Batchelor, John Kreusi, and Martin Force, and acknowledged the above to be their signature

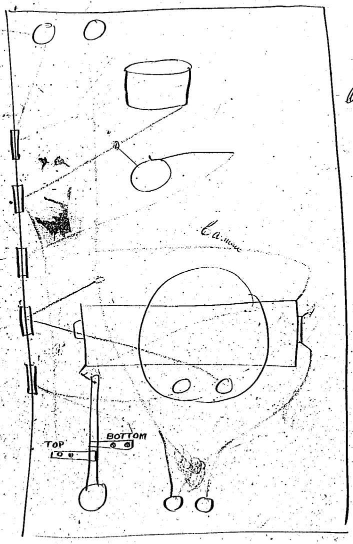
Notary Public.

Telephone
Edison's Automatic Switch

Oct 14 1878
Chas Batchelor

T A Edison
J Kruesi
Jm M Force




Ca.
TOP
BOTTOM

Oct 24 1876
Chas Batchelor
J Kruesi
M N Force
T A Edison

A. EDISON.

Menlo Park, N. J., Nov 1st 1878

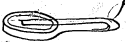
Carbon Cup

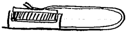
Safety Carrier

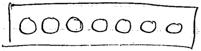
Chas Batchelor

M N Force

J Kruesi







T. A. EDISON.

TAE Menlo Park, N. J., Nov 7th 1878

J Kruesi

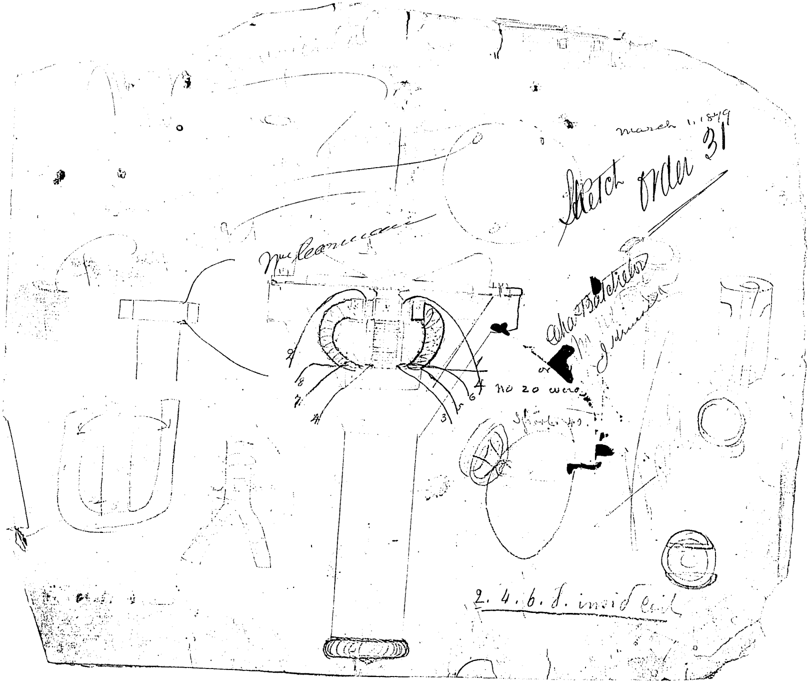
Chas Batchelor

M N Force

membrane, use one of the mesenteries for string telephones

It may be a different one will do better if they are great veins.

J Kruesi


9
8
7
4
1
4
6
5
3
No 20 wire
or
Spiral 40.
2. 4. 6. 8. inside coil

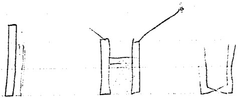
March 1, 1879

Sketch order 31

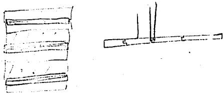
Wm Carman

Chas Batchelor

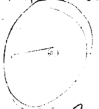
Jas Adams

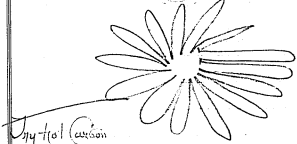


May 10 1879 TAE

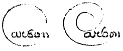


Instead of Cu sulphide use Tellurium & Cu point.
or Tellurium point & German Silver, agitation generates
Thermo Current





Try Hot Carbon



Vol 14 — 169

Blake

T. A. EDISON,

Menlo Park, N. J., Oct 19 1880.

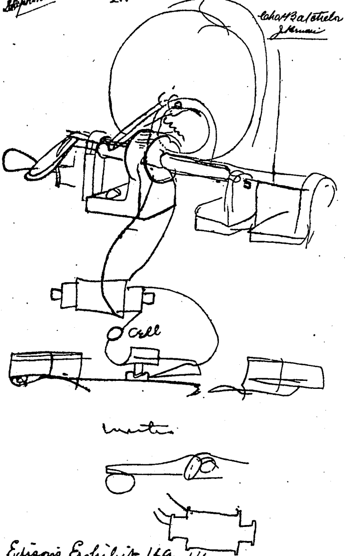
EDISON'S EXHIBIT. 169-14.

Magnetic ~~Tel~~ Telephone -

No 218

July 18th 1879

Chas Batchelor
J Kruesi



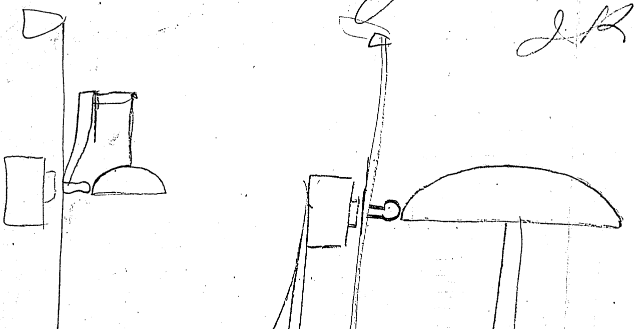
Edisons Exhibit 169-14

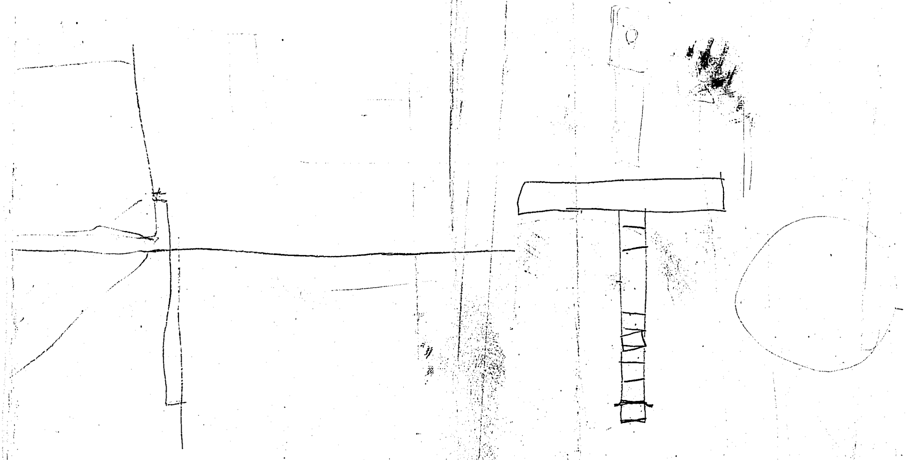
S. L. G.

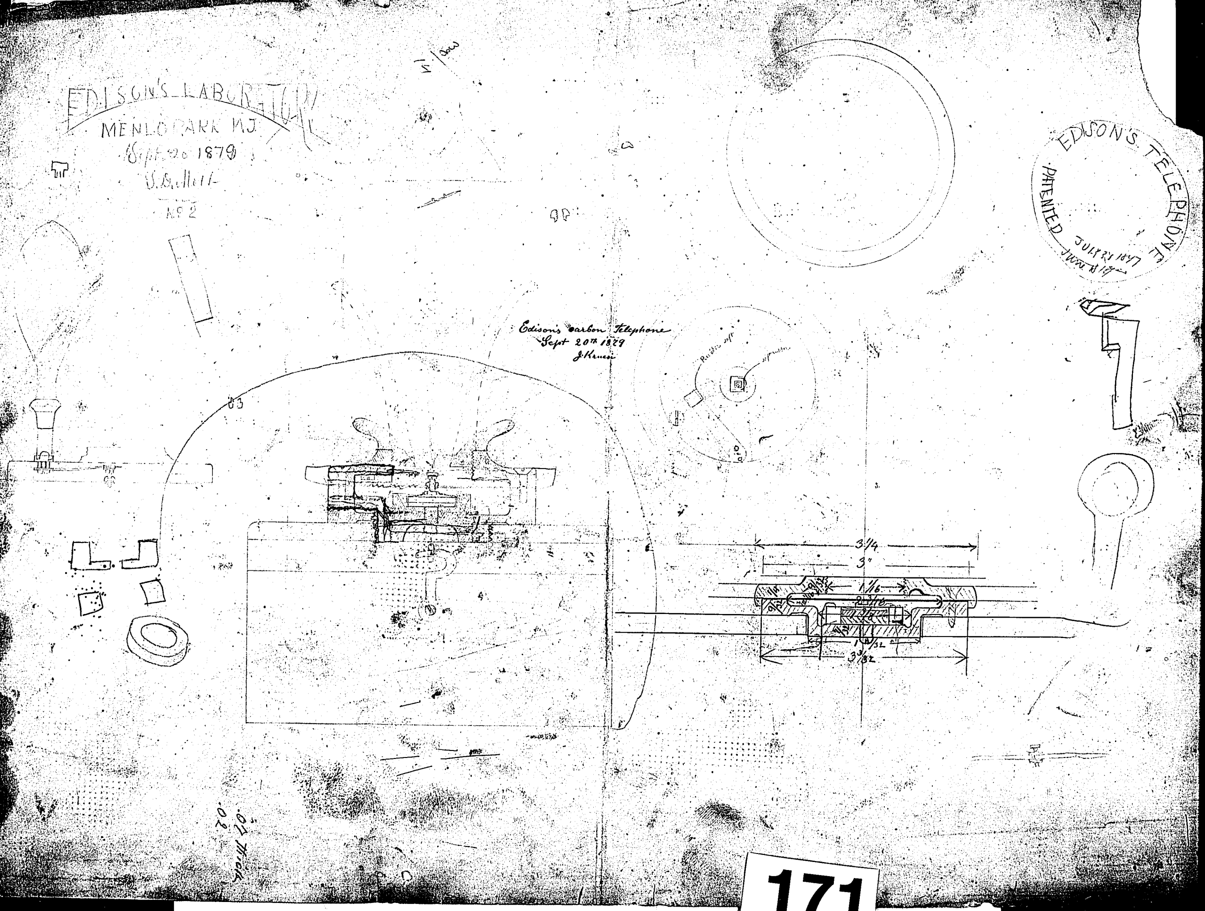
Telephone

Aug 20th 1879

J.K.



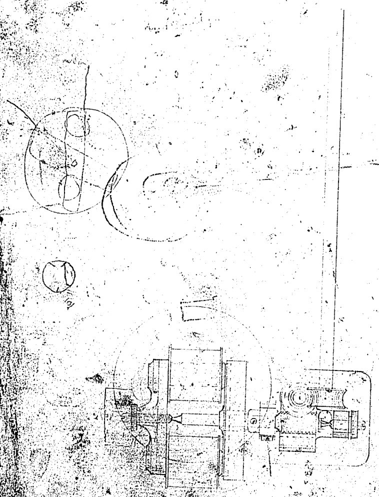


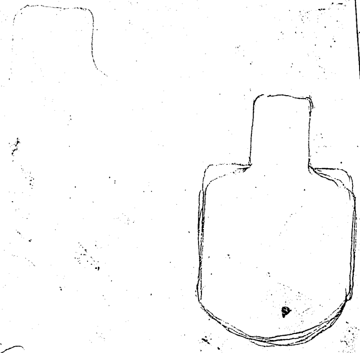

3 1/4
3"
1 1/16
1/4
9/32
9/32
2 3/16
3/8
1 11/32
3 3/32
Rubber soft
Thick .07
.02

EDISON'S LABORATORY
MENLO PARK NJ
Sept 20 1879
S.D. Mott
No 2

Edison's carbon Telephone
Sept 20th 1879
J. Kruesi

EDISON'S TELEPHONE
PATENTED
JULY 31 1877
JAN 8





10 layers of No 26 = .018 Diam wire

72½

Electric Engine Telephone

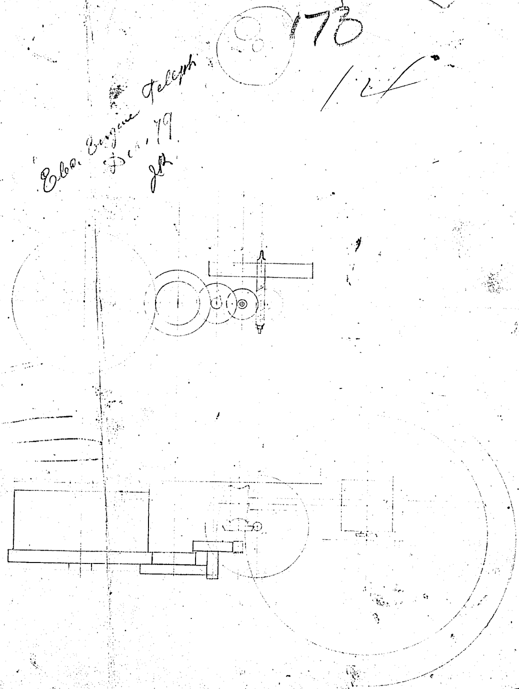
JR

Doc. 49

12

173

1/4

Elec. Engine Telegph
Dec. 79
JK